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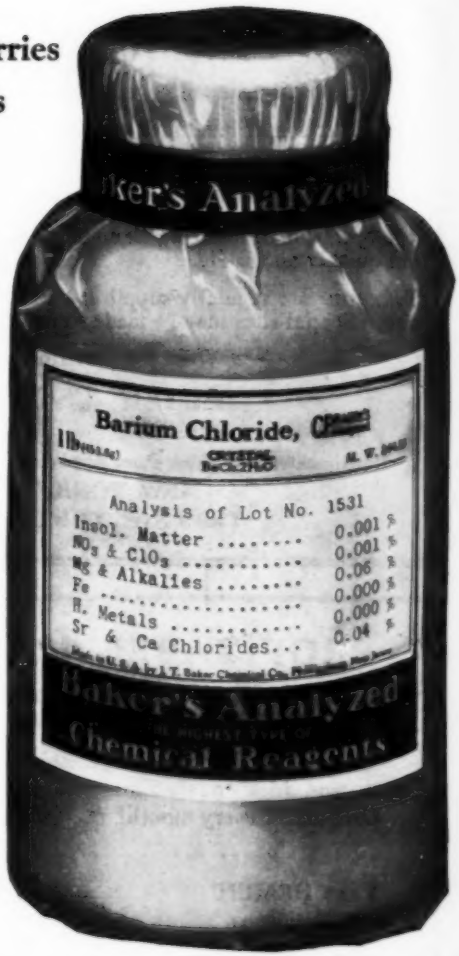
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EDITORIALS

The Value of Science

MORE and more in recent days the question of the value of science to mankind has been discussed. People are no longer conceding the value of scientific achievement. The phrase "technological employment" is heard. So first-rate an intelligence as Mr. Gandhi hopes to keep modern scientific apparatus in the spinning industry out of India.

The general disrepute into which labor-saving devices have fallen indicate what? The twilight of science or merely the prelude to the dawn of greater achievement? As noted and respected a scientist as Dr. C. E. Kenneth Mees of the Eastman Kodak Company doubts that science has added to the happiness of the race. In *Research Narratives* he speaks as follows:

"If I could exchange the life that I lead in a modern city for a life in Athens of the Periclean age or Thebes under the 18th Dynasty, I think that I should undoubtedly accept it. There is little that a man can get today which he could not have had in Athens. It is better to walk a short distance than ride a long one....

"I believe that the life of the future will be closer to the life of the past than it will be to the life of today. I believe that a large portion of mankind will abandon the feverish quest for material things and will employ its greater leisure in the development of art and in the cultivation of its soul. This Utopia of the future may be possible primarily because of engineering progress, and in that sense at some time engineering progress may be a blessing to mankind. Up to the present time I doubt whether on the whole it has been."

We disagree with those who think science has failed to contribute to human welfare. It has admittedly prolonged life and it has benefited man materially—and aesthetically and even spiritually. One has only to remember the high esteem in which Tyrian purple was held to realize how materially poor the world of that era was; and the number of people supported in even that meager state of luxury was much smaller than today. The intellectual emancipation enjoyed by the Greek philosophers is perhaps a dubious good as regards individual

happiness. However, we regard their state as superior to the misguided joys of the illiterate; and we feel that chemistry, like the other sciences, has played a part in making an enlightened mind at least a possibility for a larger fraction of mankind.

Proof of accomplishment, however, lies very definitely with science. If science really has accomplished anything it ought to be possible to demonstrate the fact. This we regard as one of the main duties of *The* CHEMIST.

Open Mind

THE latest news is that Professor Einstein has abandoned his four dimensional theory of space in favor of a new conception involving five dimensions. The only effect upon our own knowledge is that Dr. Einstein is now two dimensions instead of one dimension ahead of us; but we do feel that some comment ought to be made on his scientific willingness to admit that experiments have proved him wrong.

Such a spirit is admirable and all too rare in a science in which it ought to be the predominant mental attitude. The bickering that went on in the attempt to uphold the Lewis-Langmuir atom and the existence at the present time of many disputatious schools of thought as to sugar structure are only two examples of the dogmatic tendency.

Dr. T. W. Richards used to say that every mind contains pigeonholes extending from the absolutely true on one hand to the absolutely false on the other—and that the only two compartments always vacant in the educated mind are the two end compartments. Dr. Einstein seems to have the educated view-point. More chemists ought to follow his lead.

Lack of Analysts

A number of educators have stressed recently the importance of analytical chemistry. The latest voice to speak on the pro side of this question is that of the Employment Bureau of The Chemists' Club. Mr. Killeffer tells us that there is a genuine dearth of good analytical chemists, or at least of chemists who are willing to admit their ability to do analytical work.

Perhaps the fear of being installed in a rut in a plant testing laboratory has been ingrained too deeply in our students. Certainly no one with initiative need stay in any testing laboratory unless he wants to; and the control laboratory of the average plant, too often under the direction of a low grade chemist, is precisely the place where the high grade

chemist can display his own ability. The experience, moreover, may be valuable—for good analytical work is apparently in such demand as to be profitable both professionally and financially.

Declining Registration

IN Germany chemical employment is falling off. Compared with 1930 the total number of employed chemists of both sexes has decreased by about 4%. The number entering the profession in 1930 has declined to about one-third that of 1928.

More important, however, is the additional fact that the number of beginners in the universities has decreased. This is as it ought to be; and we wonder what the corresponding figures would be in the United States.

It begins to look as if industry will be organized under some system in which productivity per producer will be even greater than now. Our present supply of chemists will be able to take care of technical problems even more adequately. The question arises whether or not the chemist factories are not being overdeveloped as the chemical factories were overdeveloped in the immediate past.

Something ought to be done, whether it is the curtailing of the number of chemists and the diverting of this man power into other fields for increasing human wealth, or whether it is the six-hour day. Has chemistry sufficient wealth-producing potentialities to absorb an unlimited accretion of new talent? Theoretically it has. The statement is made that the great fortunes of the future will be made in developing the world's resources, as the great fortunes of the past were made in exploiting them. There ought to be, however, some charting of this particular sea before the young student is invited to set sail upon it.

The Consulting Chemist

By Thomas A. Wright

A leading New York consultant discusses the work of his branch of the chemical profession. What the consulting chemist does, what he needs to be.

ANY article purporting to cover the field of the consultant, whether he calls himself chemist, chemical engineer, metallurgist, or metallurgical engineer, must of necessity be very sketchy. There is a multiplicity of material that makes for confusion.

Chemists in general pride themselves on their ability to get at the facts; all the more reason, therefore, why they should stick to them. There are few professions in which honesty with one's self is so important as in chemistry: there are few of the many branches of chemistry in which honesty is as indispensable as it is to the consultant. No attempt will be made to mention the requirements in any order of importance; but such stress as may be laid on any characteristics will be based on the use of the word successful as referring to the achieving of a high order of service to others. Such success may or may not be accompanied by marked monetary return; with certain exceptions, noted by their rarity, it usually is not.

It has been the observation of the writer that to those most respected by their fellow consultants, chemistry has been an avocation as well as a vocation. It is not strange, therefore, that the consulting chemist, while he is sympathetic to short hours for others, knows little about them for himself. The days are all too crowded, the hours all too short, distractions all too common. Let those, therefore, beware, who may be considering entering on such a career, if they like routine or an ordered existence.

In the early days of chemistry, most chemists practising the art were consultants. As it developed in knowledge and experience, the art became a profession. At the present time, those engaged in it appear to have separated into two more or less distinct lines, one of which is little more than a highly specialized trade, the other truly professional. It is the latter group to which the consultant may be assigned, for, taken as a class, his field is industry as a whole.

Whether it is industry at large or the people themselves who are responsible, one may not venture a guess, but, at any rate, the cry is for change, change, change. To some of those enlisting the services of a consultant, change means an improvement in quality, a cheaper labor cost, or a quicker method. Because of present day low unit profits and large volume, one may thus describe the demands of the larger industries dealing in staples. On the other hand, to those who cater to the likes and dislikes of people, or to their comforts and luxuries, or to the senses, change may mean something new or novel.

Different Kinds of Consultants

The consultant may be a specialist, particularly in the larger cities, where the main offices of large companies are found and where many diverse products are represented. Specialists thrive also in those areas where one industry is paramount.

For the country at large, the consulting chemist is of necessity a general practitioner, just as is the country doctor. This division does not, of course, hold true when rigidly analyzed—for the paradox is that to be of the most use as a specialist one must have as broad a training and experience as possible.

Neither is it strictly true to state that the general consultant comes in most direct contact with the public, while the specialist looks chiefly to the large industries. Nevertheless, it probably covers the point sufficiently. The general consultant as a rule must have a laboratory in which he can make routine analyses for the individual or for the small company without a chemist on its staff. The specialist often has little or no laboratory facilities. A general consultant must often seek out his clients, although he will always have a number who call on his experience of necessity and perhaps, as is too often the case, reluctantly.

The specialist, however, is often called in by an industry; in other words, industry goes to him. And the reasons for this are interesting and instructive.

Company A and Company B, we will assume, are both engaged in producing material in a comparatively narrow field. It may be the

refining of a metal, a particular line of dyes, certain types of food, or perhaps solvents. Both, of course, as is the case with all successful companies, have their own staff of chemists.

Company A will retain a consulting chemist or chemical engineer because of specialized knowledge and experience in some one or two phases of A's product. Company B may select a consultant for an opposite reason, that of a wide knowledge.

Why Consultants Are Necessary

The reason for their different needs lies in the companies themselves. A's chemical staff may not have time to devote to acquiring a knowledge of the finer details; or they may require a check on their own findings. B's chemists may be so tied down by production problems that they have little time to learn what the other man is doing.

In general, for the lack of any or sufficient knowledge by the one retaining his services, the consulting chemist is increasing in number and in influence as industry and the public at large realize the value of his work.

In the smaller cities and less highly organized areas, however, it is the consultant of the general type with which the public is most familiar. A growing appreciation of the wide field involved will probably continue the present trend, which is steadily limiting the activities of such chemists.

Thirty years ago, it was not unusual for a commercial laboratory to act as consultants on or analyze such varied materials as soap, foods, metals, leather, ores, waxes, drugs, or fertilizers. Today, there are many cases where it would not be considered ethical. It is done, of course, but it doesn't often pay the client and it rarely pays the chemist.

Requirements for Consulting Chemists

What, then, are the requirements other than experience that will aid in guiding the public, whether it be engineer or layman, in choosing the consultant? And what requirements must be regarded as necessary by the employee chemist contemplating entering the ranks of the independent professional. Since consulting work involves coming into contact with all sorts and conditions of men, the requirements are many. One must be able to step from a conference in the office of a captain of industry to the side of an uneducated laborer in the mill; discuss theoretical chemistry with an academic research chemist one moment and go next to an engagement with a cost accountant or purchasing agent.

METALLURGICAL LABORATORY WITH TESTING EQUIPMENT

Or perhaps the next session is with an enthusiastic inventor possessed of a real idea but with all the foibles of genius; or he may have a wonderful proposition half worked out—probably fully worked out by many others previously and found wanting—and for which he must have some fantastic sum in payment. Or it may be that he has partially developed what has every appearance of a needed and worthwhile product, but insists on holding back his full confidence—and must be encouraged and coaxed to make a complete disclosure.

Personal Equation

It can be readily seen, therefore, that the consulting chemist, giving personal service as he does, must have imagination and the ability to put himself in the other man's position. This in turn requires a sympathetic and real interest in people as such, for like the physician and lawyer, your consultant is ever confronted with the personal element and the human equation. Tact? Yes! A sense of humor? By all means! And discretion. Together with discretion, one must also have reticence. Not too much, but enough.

The relations between the client and consultant are often of a highly confidential character. It is quite as obvious that the consultant is selling his knowledge plus his opinion. This is true whether it be the design of the chemical engineer, the process of the chemist, or the report of an analytical chemist. After all, most analyses are, as a fellow consultant has well said, "but the opinion of an analyst or chemist summed

up in figures." If this were more generally recognized there would be fewer analyses accepted on blind faith on the one hand, and fewer unjustly criticized on the other. Both errors are all too common.

Keen Ethical Sense Necessary

The professional or independent chemist, therefore, must be judicious and also judicial. Particularly is this true of those engaged as umpire or referee chemists, for the majority is not always right. Then, too, one must be judicious as to what type of knowledge may be passed on. One may know certain things and avail oneself of them in forming an opinion. Yet they may have been acquired in some previous confidential contact and are not quotable.

One learns to be judicial through court cases and actions; not through constant contact with lawyers, which the fates forbid, but rather through a practice often followed by chemists when retained as consultants. This practice is—having assured oneself of the ethics of the case—to study first the questions involved as though one had been retained by the other side. One can then better appreciate the virtues or weakness of one's own. Until the day comes when the courts cease to depend upon sifting out the opinions of opposing chemists and appoint an independent consultant to the court, this practice will probably continue to be the best. So long as it is followed, the profession will continue free of the taint of selling its service to whichever side first retains it, no matter where truth and justice lie.

Good Court Practice

In courts, by the way, the consultant does well to be modest and patient and also to use plain, non-technical terms. The judge and the jury appreciate it, as the writer has reason to know; and it takes a weapon away from the sometimes sarcastic opposing counsel when time comes for cross-examination. Several years ago the writer appeared in a case involving a skin disease. The previous witness for our side was a physician who was a noted authority on the subject but who was rather positive and arbitrary. He created anything but a favorable atmosphere for the next witness which was myself. Realizing my own limitations, and not wishing to give counsel for the other side an opening for personal attack, which is often resorted to, it seemed best to clear the board at the start. So, having been put on the stand (and incidentally being qualified without question on the mere statement that I was a Fellow of The American Institute of Chemists) I asked permission of the

judge to make a further statement for the record, to wit: that nothing I should say or be led to infer was to give the impression that I was testifying as an authority on the skin or its diseases. This, together with a use of plain English in describing certain processes or commenting on certain chemical reactions, found favor in the eyes of a judge noted for his stern manner with both witnesses and lawyers. He had been none too lenient with the previous witness.

After an hour or so on the stand during which various types of sulphur had been discussed, opposing counsel suddenly grew facetious and asked the witness if the kind of sulphur last mentioned was that used by His Satanic Majesty. Witness being a consulting chemist, replied that he hadn't met and did not know the gentleman. To which His Honor commented, "Surely the witness must have heard of him around New York!"

Practical Knowledge an Assistance

In another case, concerned with smoke or fume damage, a knowledge gained outside the laboratory or the library was of real value. Gardening, including the care of several dozen fruit trees, gave the necessary clue. Sulphur again was said to be the culprit. To prove it, a pail of water obtained by melting a mass of top snow was submitted in evidence. From this several samples were taken under court supervision and assigned to as many chemists. Sulphur was found in such quantities that it was inconceivable that it could have been carried down by the snow. Further examination showed a considerable percentage of lime. Fruit trees are usually sprayed with a lime-sulphur solution sometime in the winter. Apparently the solution had been mixed in that pail. The conclusion was obvious as to the source of most of the sulphur at least.

Anomalies of the Profession

But, you say, in all these rambling remarks there has been little of chemistry, of previous experience, of college or other training. So there has. The writer has heard that point raised among consultants when talking shop. You may hear them say they haven't had a beaker or a test-tube in their hands for months or perhaps years. When speaking of chemists, it seems to be necessary to bring in a test-tube or a retort; however, the retort will be left to those who may disagree with certain phases of this creed—they will have to supply their own. The chemist whose experience and practice leans toward physical chemistry, of course, has a much greater need and opportunity for utilizing the more

scientific phases of his knowledge; those catering to chemical or metallurgical engineering may perhaps find the commercial angle paramount, whether it be financing, promotion or sales.

While chemistry is always there in the background, its application often leads one far afield. One at times may feel a little of the lawyer, the patent attorney, the promoter, banker, or the sales engineer, and anything but a chemist using science.

Chemistry Still the Groundwork

Chemistry is the foundation, however, no matter how or where the education was obtained. Probably in no branch of chemistry would it be so desirable for the student to take up first a general cultural course before attacking the technical and scientific subjects—a pre-course, if you will, including such subjects as public speaking, logic, psychology, elements of accounting, and business law. A chemist may be noted for his mastery of the subject, but lacking some of the qualifications mentioned here and that of passing his information on to others in an attractive and understandable form, he would hardly succeed as a consultant.

Leaving college, we find the members of the profession arriving by many varied paths. Most men have been at one time chief chemists of a works laboratory, some also—among the most successful—of a research laboratory. Some have been analysts or assayers, some plant metallurgists, plant superintendents, professors in some college or university. As can be seen the approach usually is by way of an executive or teaching position.

A Day's Activities

Perhaps in summing up, the diversity of calls on the profession may be best expressed by listing a single day's major activities. While confined to that of a consulting chemist-metallurgist, it is thought to be typical.

1. A request from the Editor of *The* CHEMIST for this rambling article. He didn't ask for just this but you see what he gets.
2. A conference with a government official on the statistical position of one of the metals.
3. Another with a fellow consultant from a great distance on methods of valuation of certain materials.
4. A request to deliver an address on salvage.
5. Another as to cost of a survey of a new plant in an old industry.
6. Calls for information as to where this could be sold. To whom, what price, quantities, terms? How should it be shipped, etc.?

7. Another conference on the effect of secondary or scrap metal on the price of the primary product.

8. Time off to discuss a new process to be devised for electro-plating.

9. Checking up and proof-reading a new set of analytical methods to be submitted to an entire industry; writing a letter circumscribing and limiting their use.

10. Answering telephone calls as to who wrote this method, where it was published, and where obtainable now.

11. Examining a series of analytical reports.

12. Editing a report on the cracking of gold rings.

13. Making arrangements for a meeting of several sellers and purchasers of another product.

14. Dictating a letter calling attention to varying degrees of analytical accuracy, required or obtainable; another declining an invitation to open a branch in another city; another explaining to one old and valued client why another client takes so long to make returns on a shipment. Still another calling attention to material now being sold on too low a basis and methods of remedying the situation; and one replying to an inquiry as to the probable price of copper one year hence!

ASSAY FURNACE DEPARTMENT, LUCIUS PITKIN, INC.

15. Report on corrosion resistance and method of testing.

16. Examination of a series of photo-micrographs.

17. Discussing the merits of an analytical and spectrographic method of determining impurities in a highly refined metal; and should the plate be marked with the wave-lengths of the respective metals or with their symbols?

18. Explaining why quantitative analysis by means of the spectrograph isn't cheaper.

Of course, there were a few interruptions like applicants for positions, poor chaps, and a life insurance agent. A typical day? Yes. Typical also in that on some of this, no payment is offered, although on some none is expected. Fortunate indeed is the consulting chemist with a

sense of humor. He needs it early and often. It is astonishing with what bland assurance calls will come in for this and that and the other type of information, on which payment is expected to be made with a "thank you." Another interesting type is the business man who either innocently or designedly sends in a sample for a three or four dollar determination so he may under that guise ask for fifty or one hundred dollars worth of advice. This is perhaps excusable or at least understandable in the laymen; one can hardly be lenient, however, when it is tried by fellow chemists in industry. It is not as rare as one would think or like to have it.

Versatility Essential

To sum up, the consultant, be he chemist or chemical engineer, should have a broad technical and theoretical knowledge, and ability and experience in applying it; business and commercial aptitude; a quick and active brain, in other words, imagination; the knack of turning quickly from one subject to another far removed; tact, patience, and courtesy; a desire to apprehend the other person's position; an analytical mind; an appreciation of facts and the necessity of a sound foundation for an opinion, for one is dealing not only with others' money but perhaps at times their reputations or their lives. Last, but not least, he must be honest with himself.

The consultant is successful to the extent that he measures up to these standards.

The Chemical Situation in Europe

By H. O. Chute

An observant chemical engineer tells the impressions he received on a trip abroad. The status of chemistry in a number of European countries.

TO AN American, revisiting Europe after an interval of six years, the changes in the chemical field are apparent in several ways. Some correspond to the changes in the United States, some differ. Notably, the tendency to consolidation, with the elimination of the weaker firms, is even greater in Europe than in the United States. Consolidation is looked upon with favor by the governments, and even encouraged. In America the anti-trust law has had a restraining influence.

Of the general European situation it may be said that chemical developments have been controlled by governments and directed toward military preparation much more than toward industrial needs. The English dye works have in most cases been obtained from the government, which erected the plants, together with the explosives plants, for war purposes. In Germany the synthetic ammonia plants were paid for by the government in war times; and so little allowance need be made for capital return or for depreciation. France, Italy, and also the smaller European powers have subsidized synthetic ammonia plants and have encouraged manufacture of chemicals, not with regard to use in peace-time industry but as military preparation.

Tendency to Monopoly

In England the Imperial Chemical Industries has been formed (with government aid and encouragement) into a more complete monopoly of

the chemical industries than exists in the United States, where there are still a half dozen large competitors and a number of smaller ones. Six years ago the I. C. I. was only in the formative stage. Now it embraces not only the dye industry of England and Scotland but also the explosive interests, together with the lacquer makers. These were all war babies. The British government, much more interested in private manufacture than we, practically forced their combination. Then the alkali industry came in, together with many sulfuric acid plants—though many remain out.

The I. C. I. was also heavily subsidized to build synthetic ammonia plants, too large for peace time but just the right size for military purposes.

The alcohol companies, both those producing potable alcohol and those making denatured for industrial use, were combined with government sanction or command; and all are closely regulated, rationed, and controlled as to output and prices. One project of the alcohol trust has been the building by an American firm of two distilleries, designed to use molasses for industrial alcohol.

Many Lines Suffering Depression

Other chemical industries in England are depressed. Artificial silk, as elsewhere, is overproduced. Two acetate silk plants were sold last summer at sheriff's sale. The coal miners continue to insist on a "living wage," failing to see that their market has been taken away from them by oil and will not return. While waiting they exist on the dole.

Formerly the by-product coke ovens and gas works supplied a large amount of ammonia and coal-tar products; but now, owing to the competition of synthetic ammonia, they are seeking ways to dispose of their ammonia in the streams without violating the "alkali act" which provides against pollution or adding noxious substances to the air.

Beet sugar has been developed under a tariff disguised as a "protection of industries act." This legislation, however, is threatened. If it is removed, the industry will cease.

Petroleum Problem

Petroleum oil is lacking in the islands; and the strenuous efforts to find substitutes by such means as low temperature distillation of coal are thus far without commercial success. The Scotch shale industry is appealing to the government for support; but the flood of foreign cheap petroleum renders this industry useless at present. Some petro-

leum refineries have been recently erected in Wales for refining Persian oil, and other refining is done on a small scale—but only a small fraction of the petroleum oils used in England is refined on the island. A vapor-phase cracking plant at Hull is in bankruptcy and is for sale. Great Britain controls much oil in Persia, Burma, Iraq, and British companies have bought into South American fields—yet little of this is taken to England for refining.

British Chemical Exposition

A visit to a chemical exhibition is always interesting as showing the progress in processes, apparatus, and products. While the Jubilee meeting of the Society of Chemical Industry was in session during the week beginning July 12th, there was held the exhibit of the British Chemical Machinery Manufacturers which has been widely described and pictured. An American visitor felt at home in meeting the exhibits of the Dorr Company, Bakelite, Silica Gel, Pyrex, Babcock and Wilcox, Wagner Alkali Furnace, Monel Metal, Cottrell, and other familiar names. Exhibits of leaf filters, roasting furnaces with revolving rakes, etc., were also reminiscent of home.

Resistant steels of European invention were exhibited in great numbers. Nearly all the old standard forms of apparatus for filtering, boiling, distilling, and other chemical operations were exhibited, but many were of styles largely discarded in the United States in favor of more recent types.

In England chemical machinery, unlike chemicals, is not protected by a tariff. Strong foreign competition has therefore stifled British growth in this direction. Very little was shown at the exposition that is not familiar to the United States chemical industry.

Strong Potentialities

Yet the industrial layout in England has possibilities. In the Liverpool district are coal mines, by-product coke ovens, and tar distilleries. Sulfuric acid plants are located near the harbor, where Spanish pyrites together with Italian sulfur are discharged from vessels. Salt brine pipe lines are as plentiful as the oil lines in our oil fields. The synthetic ammonia plants now give the cheapest method of producing nitric acid, displacing the acid that formerly came from Norway in aluminum-lined drums. With a consumption of dyes and chemicals by the textile industry close at hand offering a large domestic market and with ships leaving daily for all parts of the world, the American observer realizes

his own country does not have any superior natural facilities for producing chemicals for world competition.

The Situation in France

In France the principal chemical industries were well exhibited at the Colonial Exposition already described by the writer in other journals. French industry is alive and progressive. By her war gains France became possessed of coal and iron ore as well as potash; and she has developed these and attendant chemicals, using to a large extent the hydroelectric developments in the Alps and Pyrenees. Her electrometallurgy and electrochemistry have both made rapid strides of late years.

France has developed her colonies and has been particularly successful with the production of phosphates, which now play a large part in European agriculture. The French, however, are extremely individualistic and have made few large combinations of capital in the chemical or other industries.

Spanish Industries

Spain, a combination of the old and the new, is known more for her minerals than for her chemical products. Yet a trip down the river from Bilboa reveals modern by-product coke ovens, eight large iron blast furnaces, and a large steel works—all showing English influence. These were all shut down, but some smaller furnaces were running, and a large shipyard had a little work on the ways. Iron ore was coming down the mountain on a wire tramway. A large part goes to England in the ships from which the coal is unloaded.

Bilboa, the Pittsburgh of Spain, is in the country of the Basques, who had stone turbines with carefully curved blades before the iron age, as is shown in at least two museums. They had their own iron forges before the Romans got copper from that country.

South of the Pyrenees the country becomes as dry as Arizona, yet the olive tree will grow, furnishing olive oil for soap and lubricants as well as for food purposes. Quite modern cement mills, which were fostered by King Alphonso, dot the country. They were used in building the numerous excellent concrete roads.

One can sit on the porch of the Alhambra hotel and see the smoke of five sugar factories, using beets grown by irrigation, as in California; but the ditches were dug by the Moors before Columbus met Isabella at Santa Fe, which can be seen in the distance. While the ditches are old,

the cement plants, the sugar factories, and the molasses distilleries of the alcohol trust are modern and up to date.

Cork gathering, though not a chemical industry, is important to the chemist. The trees grow along the mountain sides near Gibraltar, producing great quantities, most of which is shipped to America for corks, insulation, and linoleum and like industries.

Other Countries

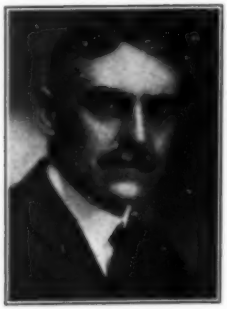
Holland was never prominent in chemical manufacture. Belgium, though recovered from the destruction of the war, is much worried over the mysterious deaths which still occur in the Meuse valley. The zinc smelters and other chemical works have been blamed, but the problem does not seem to have been solved. The chief chemical development here is the manufacture of synthetic ammonia from by-product coke oven gas. Both of the Low Countries as well as France have compelled the German manufacturers to let them into the world nitrogen markets on favorable terms.

Since the writer's departure the British pound has left the gold standard, followed by the money of many other nations. Political disturbances in many countries have become serious, so that these govern the chemical situation. Germany is once more threatening industrial and political collapse if forced to make payment of reparations. The export program of Russia has been seriously curtailed by apparent failure of the Five Year Plan to come up to expectations. In the Far East, the great potential market of the world, war becomes hourly more imminent.

Chemical manufacture seems of little importance beside the serious world questions now seeking solution; and the ultimate fate of the industry in all these countries will depend largely on future world developments.

Chemistry at Princeton

By William Foster



A brief historical outline and a description of the course of study a leading American university considers essential to the education of the chemist.

CHEMISTRY has been taught at Princeton for 135 years. In 1795, one year after Priestley emigrated to America, Dr. John Maclean, a member of the Faculty of Glasgow University, came to Philadelphia. On the advice of Dr. Benjamin Rush[1] he went to Princeton, where he was shortly elected Professor of Chemistry and Natural Philosophy in the College of New Jersey, the name of which was changed to Princeton University on the occasion of the celebration of the Sesquitennial in 1896.

Maclean had been thoroughly trained in medicine, surgery, and chemistry. He had completed his studies in Paris and was, therefore, familiar with the pioneer work of Lavoisier, Berthollet, and others. When he took up his work at Princeton, he was in sympathy with the newer ideas regarding combustion and was, therefore, opposed to the theory of phlogiston. In 1797 he prepared "Two Lectures on Combustion: Supplementary to a Course of Lectures on Chemistry Read at Nassau Hall. Containing an Examination of Dr. Priestley's Considerations on the Doctrine of Phlogiston, and the Decomposition of Water." As Dr. Maclean had other engagements, a part only of the first lecture was read to his students. Both lectures were printed in Philadelphia by T. Dobson, in 1797, "to save the young gentlemen the trouble of transcribing them."

[1] A graduate of the class of 1760 of the College of New Jersey and a signer of the Declaration of Independence.

Dr. Maclean was one of the first professors of chemistry in an American college. Indeed Professor Silliman, Jr., of Yale, in a paper entitled "American Contributions to Chemistry," which was read July 31, 1874, on the occasion of the Priestley Centennial, said: "Of the public seminaries of learning other than medical institutions where chemistry was taught from a separate chair and as a distinct branch of the college curriculum of instruction prior to 1800, we find but one, and that distinction belongs to Nassau Hall, Princeton, New Jersey."

In 1797 Dr. Maclean's salary was 250 pounds *per annum;* and it was "ordered that chemistry and natural history be taught as branches of natural philosophy." The instruction in these branches was given to juniors and seniors. Dr. Maclean taught at Princeton until 1812. For several years his salary was $1250 a year, together with the use of a college house.

Other Early Chemists

Another of the early chemists who taught at Princeton was Jacob Green. He filled the chair of "Experimental Philosophy, Chemistry, and Natural Philosophy" from 1818–1822. In 1825 Green became one of the founders of Jefferson Medical College, where he was the first professor of chemistry. He was a splendid example of the old-fashioned, broadly trained teacher. His *Chemical Philosophy*, in 1829, presented the fundamentals of chemistry in a remarkably lucid fashion.

With the establishment of the John C. Green School of Science in the early seventies, a great change came about in the teaching of science. Among the new professors called to the college was Henry Bedinger Cornwall, who was educated at the Columbia School of Mines and at the famous Royal Mining Academy, Freiberg, Saxony. Professor Cornwall was an excellent analytical chemist and one of the most eminent American mineralogists. He taught at Princeton from 1873–1910.

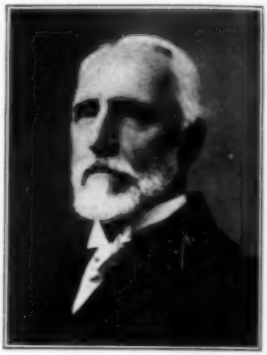
In the course of time, he was joined by LeRoy W. McCay, who had been thoroughly trained under Winkler and Bunsen in Germany. Dr. McCay was elected assistant professor of analytical chemistry and mineralogy in 1889, and in 1892 he succeeded Dr. John S. Schanck as professor of general chemistry. His brilliant lectures made a deep and lasting impression.

New Era

A new chemical laboratory was built and equipped in 1891, so the old era passed away and the great change began. Physical chemistry was added as a separate branch in 1904. As stated by Professor Hugh S.

Taylor, "During the lifetime of the old laboratory the science of physical chemistry has had its rise to full estate."

Owing to the great growth and development of the department, the laboratory erected in 1891 was entirely too small within a quarter of a century. In 1915 the University was on the point of erecting a new laboratory which was to have been the gift of the late Henry Clay Frick. Mr. Frick went so far as to purchase for the University the plot of ground for the building, but the advent of the World War made it inadvisable to build at that time. The Frick Chemical Laboratory was erected in 1929 from the design of Charles Z. Klauder, and is of the collegiate Gothic type of architecture. The building is constructed of native stone, granite, and limestone; and, as expressed by the architect, it is "built around the stockroom." The cost of the building and equipment was over $1,500,000. It is splendidly equipped not only for undergraduate teaching, but for research work in the various branches of pure chemistry.



PROFESSOR HENRY B. CORNWALL

At the dedication of the building on September 26, 1929, President Hibben said that the Laboratory would not have been justified if the University had not had at its disposal the recently completed $3,000,000 fund for research in pure science, and if it did not have men capable of excellent research work.

Plan of Undergraduate Study

Princeton has long stood for sound and thorough undergraduate courses. During the administration of President Woodrow Wilson the undergraduate course of study was revised, and the preceptorial method of instruction was established. This applies to what may be called "reading courses." There is not the same need in the sciences, for they are taught not only by lectures and classroom conferences and recitations but also by the laboratory method, thus bringing teacher and pupil into intimate contact.

The undergraduate course of study has been revised again during the administration of President Hibben, the new plan for the upper years being known as the "four-course plan." Under this plan the student is supposed to do a considerable amount of independent work, as I shall

explain in connection with the plan of study for departmental students in chemistry.

Within a few years the elementary courses in chemistry at Princeton have been thoroughly revised. There are no less than five different courses given in general chemistry. Pedagogical methods have been critically examined in recent years, and radical changes in educational procedure have been made. What we have done in the way of revision is in line with modern tendencies. The plan in brief is as follows:[2]

Course 1.—This course is open to all students who have had no previous training in chemistry. Those taking this course usually have in view a career in which a knowledge of chemistry is essential, such as chemical engineering, medicine, research work in chemistry. Much stress is laid upon theory and practice, and the descriptive side of chemistry is not neglected. The lectures are supplemented by weekly quizzes and conferences, the class being divided into divisions of ten to fifteen. Many of the most experienced teachers take charge of these divisions as well as of divisions in other courses given primarily to freshmen.

Course 2.—For many years all beginners were taught in the same classes, no attention being paid to the proposed career of the men. It was our experience that many students were not particularly interested in the more technical aspects of the subject. To provide for men who wish to include some chemistry in their educational program and who are mainly interested in the cultural value of the subject, Course 2 was offered. The course is taken by about one hundred students. It runs for an academic year, and it is less technical than Course 1. There are two lectures weekly, in which numerous experiments are shown. In place of laboratory work there is much assigned reading, and there are weekly quizzes and conferences as well as frequent written tests on the lectures and assigned reading.

The first half of the year a sound course is given in fundamental chemistry. This makes it possible to offer a more diversified course the second term. During this term special lecturers are called upon. This offers variety and adds to the interest of the course. Last year, for example, my colleague, Professor Hugh S. Taylor, gave six lectures, entitled as follows:

1. Speed of Chemical Reactions. Chemical Equilibrium. Catalysis.
2. Sulphur and Sulphides. Chemistry and Economic Geography.
3. Sulphuric Acid—A Yardstick of Civilization.

[2] Dougherty, *J. Chem. Ed.*, **5**, 851 (1928).

4. The Rôle of Nitrogen in Peace and War.
5. New High-Pressure Reactions. Chemistry and Its Relation to Business and Politics.
6. The Retardation of Chemical Reactions. Conservation and Preservation.

Dr. LeRoy W. McCay gave a lecture entitled "Student Days in Germany."[3]

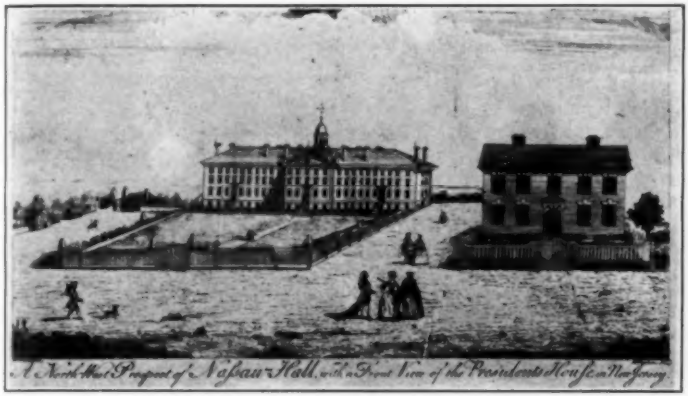
Members in other departments of the University are now and then called upon to give a lecture. One year Professor Karl T. Compton lectured on the structure of the atom; Professor Henry Horris Russell, on the chemistry of the stars; and Professor E. Newton Harvey, on cold light. An occasional lecturer may come from the outside. To one class the late Dr. Edgar F. Smith gave a beautiful lecture on Joseph Priestley which made a profound impression. It is stimulating for a young man to hear an eminent specialist tell about his investigations.

The writer has had charge of the courses described, and he feels that the results have been gratifying. The students are far happier, the laboratory is freed of men who are not particularly interested in the more technical aspects of the subject, and the department of chemistry, in the writer's opinion, is not losing anything.

Some may criticize Course 2 on the ground that no laboratory work is given. The criticism was answered quite well by a distinguished colleague who learned most of his chemistry under some of the great German masters half a century ago. According to him, there was no laboratory work in connection with general chemistry in his day; it began the second year with the study of qualitative analysis. No one can deny that Germany turned out eminent chemists in the nineteenth century. Furthermore, Course 2 is a cultural one. Should a student become so much interested in chemistry by the middle of the year as to wish to specialize in the subject, we transfer him to Course 1 in case he has done good work and is willing to do some extra laboratory work the second term.

Courses 3 and 4 are open to men who have offered chemistry for entrance to the University. They are alike in that ground covered in the lectures is identical—the elements and their compounds and the fundamental laws and theories of chemistry. There is no requirement as to ability as shown by secondary school records. An attempt is made to avoid as much as possible the work of the preparatory school, so a textbook is used which was written especially for second-year students in

[3] Published in *J. Chem. Ed.*, **7**, 1081, 1930.



NASSAU HALL IN COLONIAL DAYS

chemistry. These courses differ in the amount and nature of the laboratory work. In Course 3 one three-hour period per week is required, which includes experiments on the chemistry of the metals and an introduction to qualitative analysis. Course 4 includes two laboratory periods, and is ordinarily elected by men who wish to specialize in chemistry. They receive full credit for qualitative analysis, and may elect organic chemistry in sophomore year.

Course 5.—This course is offered to men who have made exceptional records in chemistry in the secondary schools and pass the entrance examinations with excellent marks. Theory is stressed rather than the descriptive part of chemistry. There are two lectures or recitations and two three-hour laboratory periods weekly. The laboratory work covers the elements of qualitative analysis and the reactions of the metals. This course prepares the student for organic chemistry in sophomore year.

It is clear from what has been written that the individual needs of the students are well cared for.

Plan of Study for Departmental Students

Students who have passed qualitative analysis by the end of sophomore year are permitted to elect the department of chemistry. There is a departmental representative to direct them. Students who intend to elect the department are advised to elect general physics as well as certain courses in mathematics. This is really necessary for men who wish to specialize in physical chemistry.

Before the end of his senior year every departmental student must have elected Qualitative Analysis I and II, Organic Chemistry I and II, Physical Chemistry I and II, and at least two upperclass courses in the department.

Every student in the department must do independent work. For this work he selects a supervisor. The following is an outline:

A. All students should familiarize themselves by reading and, where possible, by experimental work with
   1. Chemistry of the metallic elements and their compounds, with historical background.
   2. Certain classical researches.

B. They are expected to develop a special field of their own choice in regard to which their supervisors may be consulted.

C. Written papers are required.

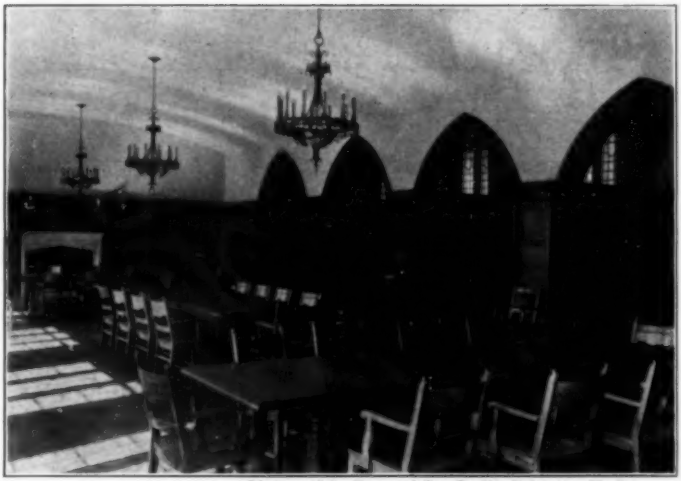
At the end of junior and senior years there are comprehensive examinations. The independent work develops initiative in the student and mades him more self-reliant, while the comprehensive examinations ensure a much better grasp of the subject than the old-style examinations.

Such a plan is also helpful to the faculty, in that it provides a sound basis for deciding whether or not a student is qualified for admission to the graduate department of the University.

The Graduate School

The graduate school, like the undergraduate department, has a limited enrolment. The total enrolment in the University of full-time and part-time students, exclusive of holders of visiting fellowships of advanced character and of incidental graduate students, is limited to two hundred. This means that the department of chemistry has a quota of twenty-five. It is no doubt a wise policy at Princeton to limit the enrolment. The department attempts to select the men best qualified to profit by graduate study. Quality is much better than quantity.

Graduate instruction is offered in the four fundamental branches of chemistry: inorganic, analytical, organic, and physical chemistry. A student specializing in one of these branches should have a sound knowledge of the other branches. There is a tendency in some institutions to neglect the study of analytical chemistry. The writer believes this to be a great mistake. While mathematical training is excellent, it will be a long time before chemists in general can sit down at their desks and



Photograph by Rose and Son Studio, Princeton, N. J.

LIBRARY OF NEW CHEMICAL LABORATORY

arrive at results by the "graphite-cellulose" method. There seems to be a dearth of first-class analysts.

The examination for the degree of Doctor of Philosophy consists of two parts. The first part of the examination is designed to test the student's mastery of the subject and is held not earlier than toward the close of the second year of graduate study. This examination may be written or oral, or both, at the discretion of the department. It is held in October and in May.

When the thesis has been accepted, the student proceeds to the second part of the examination. This is a public oral examination mainly on the more comprehensive aspects of the subject of study.

The Graduate College buildings provide a suitable place of residence for graduate students in any department of the University. They have the full advantage of a common life in scholarly surroundings. The capacity of the buildings is 150 persons.

There are various fellowships—ordinary and advanced—as well as generous endowment for research.

The Chemist in Public Health

By S. M. Weisberg

An account of the contribution of the chemist to public health through government agencies and also through the research of private institutions. The importance of knowing more about the essential chemistry of life processes.

CHEMICAL activities in relation to health are so numerous and so scattered that it will be necessary to set certain limits to this article. We do not propose to deal in any detail with the historical aspect or the pathological side of public health work but rather to acquaint the reader with what the chemist is doing at the present time in the United States to protect and improve the public health from the dual standpoint of regulation and research. Even here we can make no attempt to be exhaustive in so short an article as this must be.

I

The chemist occupies a dignified and important place in the regulatory activities of government in the interest of public health. We find many members of our profession in municipal, state, and federal laboratories. Working in collaboration with engineers, biologists, physicists, and bacteriologists, they solve the complex health problems of the urban center and the small town.

Municipal Activities of a Chemical Nature

If we had visited the Health Department of the city of Baltimore during 1929, we should have found its Bureau of Chemistry and Drugs engaged in many interesting chemical activities.

Extensive water analyses were made during the year, largely by chemical means, to insure the purity of the water supply. Chlorination of the city water was controlled by frequent analyses.

Milk and dairy products were studied from several chemical angles. The chemical detection of new ice cream and cream preservatives was worked out successfully. Research was done on detecting abnormal milk from the individual cow by means of the quinhydrone electrode for

pH measurement. The disinfection of milk bottles by raw milk producers was studied, and as a result chlorination was required.

Several interesting studies were made on atmospheric pollution from a chemical standpoint. One of these will be separately discussed later in this article.

The chlorine content of commercial calcium hypochlorites was determined and gross errors in labelling detected. The chlorination of bottles recovered from dumps and used for food purposes was required.

The new chemical refrigerants, such as methyl chloride, were studied from the standpoint of the health hazard in case of leaks.

These chemical activities are typical of the urban center in the United States and obviously require the labors of competent chemists.

The Chemist in the State Laboratory

If now we were to go north to Massachusetts, we should find two divisions of the State Department of Public Health devoted to chemical activities:

(1) The division of water and sewage laboratories. This division has two laboratories for the routine chemical analysis of water from a public health standpoint. It employed nine chemists in 1925, as well as many assistants.

(2) The Foods and Drugs Division. This division enforces the law concerning milk, food, and drugs. It employed six chemists in 1925 as well as several assistants. This division had two laboratories in 1925, the Arsenical Laboratory and the Food and Drug Laboratory. The Arsenical Laboratory prepares arsenicals for venereal disease control. Since 1923, this laboratory has prepared on a commercial scale sulpharsphenamine and distributed it throughout the state.

The Food and Drug Laboratory, among other activities, analyzes about 8000 samples of milk annually for adulteration. Here, again, the chemists are men necessarily of excellent training and bring the requisite skill that this chemical work requires.

Federal Activities of the Chemist

The municipal and state chemists co-operate with the federal bureaus in the protection of public health. It is in the federal bureau that the importance of the chemist in protecting public health stands out in sharpest relief—for he is responsible for developing the standards and analyses that are to guide the municipal and state chemists. And it is here that research of a basic character can and must be carried out.

The Food and Drug Administration, Department of Agriculture, and the U. S. Public Health Service, are the chief chemical divisions responsible for the protection of public health; though the Bureau of Mines and the Bureau of Home Economics also make contributions.

The Food and Drug Administration enforces five laws, designed to insure the public (1) pure food and drugs; (2) pure milk products from abroad; (3) import tea of good quality; (4) the proper labelling of poisons; and (5) the proper labelling and potency of insecticides.

This federal unit has a central laboratory in Washington and 17 branches. From 140 to 145 chemists here engage directly in chemical work, and many more have administrative duties.

The chemical activities are numerous and of paramount importance in the protection of public health. New methods for the analysis of food products are studied. Field and laboratory studies are made of the food industries and products. The pollution of waters is investigated. Methods for the analysis of feeding stuffs are studied, and analyses are constantly made of commercial products. Food colors are analyzed and if satisfactory are certified to this effect, so that the public may know which are safe.

Details of Drug Work

The work on drugs concerns the development of methods of analysis for medicinal products and the examination of drugs offered for sale in the United States. Accuracy of the labels used on drugs is checked by analyses. Analyses are made for poisonous substances in foods, such as arsenic on fruits or vegetables, and the physiological effect of such small quantities as are present is determined. Fraudulent products shipped through the mails and seized by the Post Office Department are analyzed, and the evidence is used in trying the guilty persons.

Typical work now in progress concerns the chemical determination of fruit acids, the purity of vinegar, the labelling of whole wheat bread, and determination of the active ingredients of certain drugs.

In the National Institute of Health (formerly Hygienic Laboratory), division of the U. S. Health Service, the chemist joins hands with the octor in the interest of public health. Many of the activities of the Institute center around the study of the etiology and treatment of diseases. These important activities do not come within the limits we have set for this article and so are necessarily omitted.

The following activities of the Institute clearly require the aid of competent chemists in their prosecution: (1) control of social diseases;

(2) study of industrial diseases; (3) standardization of drugs; (4) physico-chemical studies on the chemistry of the living cell; and (5) the study of sewage purification.

Some of the chemical activities of the National Institute of Health will be discussed in detail later in this article.

In addition to the chemists at work in the various governmental agencies in the interest of public health, there are many also working in the great universities, in private foundations, and in industry. The governmental work is chiefly of a control or regulatory character, whereas that in industry, foundation, and university partakes more of a research character.

With this brief outline of the general character of the chemists' contribution, we can perhaps now turn to more detailed consideration of special problems in public health.

II

Public health authorities, with the aid of the chemist and other scientific workers, have made gratifying progress in securing pure food, a good water supply, and satisfactory disposal of sewage, but several other problems still challenge the chemist and public health workers. One of the worst is the pollution of the air.

Atmospheric Pollution

H. W. Green in the *American Journal of Public Health* for March, 1931, gives some interesting data on the atmospheric pollution of Cleveland. An average of 119 tons of material per square mile per month was deposited in the downtown district. This consisted of 23% carbon and 77% ash. Of the ash 30% was Fe_2O_3. In addition to the solid matter, Green assumed the presence in the atmosphere of CO, CO_2, NH_3, Cl_2, HNO, HNO_3, H_2SO_3, H_2SO_4, and H_2S.

It might well be supposed that this suspended matter over industrial centers would prevent ultra violet light from reaching the lower levels; and this naturally would be a menace to the health of adults, and particularly of infants.

This was indeed shown to be the case through a research conducted in Baltimore by Shrader and co-workers, reported in the July, 1929, *American Journal of Public Health.*

Employing reagents which experienced a measurable photochemical reaction in proportion to the intensity of the incident ultra violet light,

these workers were able to show that the amount of ultra violet light was 50% greater in the country than the city and that the occlusion of the ultra violet light was proportionate to the amount of dust in the atmosphere, being greatest at the lowest level and in the center of the city. These workers also demonstrated that carbon in the form of tarry materials occludes more ultra violet light than siliceous materials.

Tanney and DeYoung (April, 1931, *American Journal of Public Health*) report the same sort of effect over Chicago, using spectroscopic and chemical methods. They state that Ives demonstrated by means of the photo-electric cell a loss of 50% in the visible light over New York City as compared with outlying districts.

It is clear that the chemist and chemical methods have contributed here a powerful challenge to the engineer to design with greater care industrial and domestic combustion units so as to reduce the volume of material projected into the atmosphere.

Ethyl Gasoline as a Health Menace

Ethyl gasoline, immediately upon its advent, was recognized as a potential menace through atmospheric pollution. Anti-knock gasoline contains, of course, the exceedingly poisonous compound lead tetraethyl. The Surgeon-General of the U. S. Public Health Service organized a committee to investigate the health aspects of the new product in May, 1925. Professor Stieglitz was among the members of this committee.

This committee found during a year's experimental study that the product did not constitute a health menace to the driver. They recommended, however, that the Surgeon-General draw up regulations concerning the manufacture and distribution of the gasoline and recommended continuance of the investigation for a longer period of time. These regulations were very successful in protecting the health of the workers in the companies manufacturing lead tetraethyl.

The expert advice of the chemist undoubtedly contributed to this success.

Mottled Enamel; a Mysterious Tooth Abnormality

Mottled enamel is a distressing condition of the teeth occurring in various parts of the world. The teeth are either a ghastly opaque white or are stained brown, yellow, or wholly black. The characteristic appearance of the teeth is the same the world over, leading to the supposition of a common etiology for this condition.

Kempf and McKay's extensive study of this ailment is reported in *Public Health Reports*, Vol. 45, p. 2923, 1930. They centered their

attention on Bauxite, Arkansas, an endemic area containing a large number of cases, and made the following observations:

(1) No case of the enamel defect was found which antedated the introduction of deep well water (deep well drilled 1909).

(2) The oldest individual found with this dental defect was born about the time the deep well water was introduced.

(3) All individuals in the community who had used the deep well water during a considerable period of enamel formation exhibited this defect.

(4) No individual in the community whose enamel had developed elsewhere exhibited this defect.

(5) Certain individuals, although residents of the community and attending school there, actually lived beyond the distribution of the deep well water and depended on the original shallow wells. They exhibited only normal enamel.

It remained for chemistry and the chemist, collaborating with the biologists, to write what seems to be the final chapter in this story. Smith, Lanz, and Smith (*Science*, Sept. 4, 1931), at the University of Arizona, seem to have proved that the causative agent for this distressing condition of the teeth was the high fluorine content of the drinking water in the endemic cases. The evidence follows.

Quantitative analyses of the water from St. David, Arizona, an endemic area, have shown a high fluorine content compared with neighboring unaffected regions. By feeding a concentrate of the water to rats a condition resembling mottled enamel was caused in the rats; and this condition closely approximated that obtained by the addition of sodium fluoride to the rat ration.

It was pointed out also that McCollum and co-workers in 1925 produced an abnormal effect in the structure of rats' teeth by the feeding of sodium fluoride. The incisors were reported to be abnormal in color.

III

In the science of nutrition the contribution of the chemist to public health has probably reached its highest expression. Here a group of biological chemists in co-operation with doctors and biologists have made masterly discoveries which are familiar to all and which will necessarily play a leading part in shaping health work for all time to come. The most enlightened of these workers are striving to uncover the frame-work of normal physiology. They hope to find that irreduc-

ible minimum of essential substances necessary for the successful promotion of optimum health.

The discovery of vitamins and their significance is now a familiar story. These mysterious factors, the constitution of which is still mostly unknown, compose six indispensable units for the maintenance of health and life. The existence of other vitamins is to be expected, and the biochemist is seeking them.

The discovery of the indispensability of certain protein units, the amino acids, is not as familiar to the general public, but here again the biochemist has made fundamental contributions to nutrition. He has established that the body can synthesize probably only two amino acids, glycine and arginine. Cystine, histidine, tryptophane, and lysine must be supplied, and probably tryosine or phenylalanine. Glutamic and hydroxyglutamic acids and proline are likewise essential. This tells us that for all time we must pay attention to the qualitative nature of our proteins as well as the quantity consumed.

The mineral requirements for the promotion of optimum health have received considerable attention from the biochemist. It is here that some of the most notable contributions to nutrition have been made. The existence of certain elements in the tissues of our bodies has long been known. O, C, H, N, Ca, P, K, S, Na, Cl, Mg, Fe, I, and F constitute this group. But the detailed functions of some of these elements are still quite obscure and constitute a fruitful field of research which is being actively cultivated by the biochemist. Moreover, new elements are being added to the list of indispensable elements, and an almost incredible picture of the function of minute amounts of elements in the economy of life is unfolding.

Iodine in Nutrition

The story of iodine in nutrition is a case in point. Research has shown that unless an amount of iodine in the neighborhood of 0.005 milligram is consumed per day health will be seriously impaired. The functions of the iodine have been summarized as follows (W. Weston, *Am. Public Health Journal*, July, 1931):

(1) Iodine permits the thyroid gland to synthesize thyroxin.

(2) The strength, weight, and growth of young depend to some extent on the mother's supply of iodine (in case the pregnant mother is deficient in iodine, the thyroid of the young will be permanently injured).

(3) Reproduction is promoted by adequate iodine.

(4) Certain types of goiter result primarily from lack of iodine.

(5) Idiocy results from continued deficiency of iodine through several generations.

Manganese in Nutrition

Very recently in a notable research two biochemists, Orent and McCollum (*Journal of Biological Chemistry*, August, 1931), succeeded in depriving rats of manganese by feeding a diet essentially free from this element. The almost incredible results that followed are best described in the author's own words.

"On the manganese-free diet young rats grow to maturity in an apparently normal manner. The females. . . go through normal estrual cycles. They produce approximately the normal number of young if mated at proper intervals with normal males. These females deprived of manganese failed in 58 of 59 cases to suckle their young. They appeared indifferent to them and did not give them the care or opportunity to suck which is characteristic of female rats on the same dietary formula with small amounts of manganese added.

"These manganese-free females when given foster young from our stock litters failed in 8 cases out of 10 to suckle them. . . the seven young reared by the other two females were retarded, apparently from insufficient milk supply.

". . . But seven of 107 manganese-free young were reared by stock foster-mothers. They were undersized and of inferior appearance. . . .

"Male rats raised on a manganese-free diet showed no abnormality other than testicular degeneration. This degeneration is well under way by the 100th day on the diet. The atrophy then rapidly progresses until only vestiges remain and complete sterility results.

"The same manganese-free diet after the addition of 0.005 to 0.05% of manganese in the form of chloride kept males in sexual potency for at least 14 months. Their testes appeared normal at the end of the experiment. . . ."

Value of Chemistry

As the essential nutrients for the successful promotion of health are gradually disclosed and their functions made clear by the biochemist and his co-scientists, the foundations of health for Mr. Everyman and family become more and more secure. The doctor, the dietician, the public health worker, the food manufacturer, and the housewife may now orient their functions on the rational basis made possible by these researches.

Experience shows that these groups do so orient themselves; sometimes too quickly, but in the long run to good effect.

The chemist has contributed richly to the promotion of public health—much more so than this article can hope to depict. But many complex problems still remain to challenge him, such as atmospheric pollution, and much attractive research will be open to him if he will train himself profoundly in chemistry and master the elements of the biological sciences. His place in fundamental health work will be one of increasing dignity and importance, as health organizations are more and more turning to basic research work for guidance.

Research, Aid to Agriculture

By Theodore Swann

Excerpts from a speech delivered by the former vice-chairman of the Alabama Industrial Development Board at a meeting of the Alabama Farm Bureau. Chemical industry as an outlet for farm products.

BY THE co-operation of agriculture and industry a parallel program of development has been evolved and is now under way.

The United States Bureau of Standards, the Alabama Polytechnic Institute, the University of Alabama, and Swann Research have united in the erection and operation of a semi-commercial experimental plant for the manufacture of xylose from cottonseed hull bran. Xylose is a five-carbon sugar which some believe the human system will not assimilate. It has been known to the chemists for many years but largely as a curiosity, with no practical use. If, during the long tests now being conducted by the medical profession, no injurious effects are found, then xylose can be used in making a candy that is non-fattening; or it can be

mixed with caramel, chocolate, or nuts to obtain candy with less calories. This will assist the fairer sex to reduce. Likewise, it will be a great blessing to those suffering with diabetes.

The Farm as a Source of Chemicals

Based on the experimental work done at Anniston, Alabama, we have hopes that we can take the cottonseed hull bran, of little value today, and not only convert it into xylose, a non-fattening sugar, but also take the spent bran and use it as a filler in plastics as a substitute for wood flour. The plastic industry will show a tremendous growth in the next ten years, thereby increasing the market for approximately one-half of the product of the cottonseed hull bran in the course of its manufacture into xylose.

There are many other ways in which co-operation and research can bring agriculture and industry closer together; and if only a few of the products now under investigation are successful, it will not be long before many of the raw materials for the manufacture of important chemicals will come from the farmer. As an illustration of what I mean by this statement, I select at random levulose.

Levulose, like xylose, is also a special kind of sugar, sometimes called fruit sugar. It is one and one-half times sweeter than cane sugar and is known to be more easily digested. It is being made in small quantities by extraction from the root of the Jerusalem artichoke, which can be grown with ease in the light soils of the South.

Starch from Sweet Potatoes

Hundreds of millions of pounds of starch are being made annually in this country from white potatoes, wheat, and corn. The sweet potato has never been used extensively for this purpose, but it has been found to yield a starch that is apparently of special value for use in textile manufacturing and other purposes.

The United States Bureau of Standards is working on this problem in co-operation with the Alabama Polytechnic Institute. If this research is successful, it will mean a very much wider market for the southern sweet potato.

Alpha-cellulose is needed to make rayon, lacquers, and many other widely used cellulose products. Heretofore cotton linters and wood have been the chief sources of this material, but research has found that it can be cheaply made from bagasse, thus creating another use for this largely wasted material.

The successful operation of the farm or group of farms presents no different problems from those presented by the operation of the small factory or a group of factories or any other industrial enterprise. Farms, as well as manufacturing plants, must be properly financed, production costs must be kept in line with competition, and the marketing carried out on sound principles. In solving its problems, industry has found that research pays. As an example, our own company has spent in Alabama during the last five years more than one million dollars in research. We would not have spent this money had we not been convinced it would bring us an adequate return.

In the conduct of our chemical business we have a commercial research department whose duty it is to determine if there will be a market for any product the manufacture of which is being considered. After the product has passed the research department, it goes to the development department for the pilot plant operation and then to the regular manufacturing department. Eventually it is turned over to the sales department as a routine matter in selling.

Nature as a Chemical Laboratory

The farmer, like the industrialist, must take advantage of every opportunity. Industrial chemists are not only searching out better ways for making established products but also new and better products. Nature is the greatest chemical laboratory in existence, and the farmers are the managers of that plant. The expense of constant research is too great for the farmer to carry as individuals but he can accomplish much by co-operation. The farmer's objective and the chemist's objective are constantly becoming more closely related and dependent one upon the other.

Opportunities for Chemists in Latin America. *Part II*

By Henry Arnstein

An internationally known expert continues his study of the possibilities awaiting the chemist in the South American republics.

THE largest and most important of the Latin-American countries is Brazil, which is the fourth largest country in the world, by far the largest in South America, and which touches the boundaries of all the South American countries except Ecuador and Chile. It has an area of 3,286,170 square miles and a population close to 40,000,000. Its seaboard is 4060 miles.

Brazil is larger than Australia or the United States and is approximately four-fifths the size of the European Continent. Its great fertile plains yield all of the products of the tropics and the sub-tropics. It has immense wealth in natural resources. Its forests have not yet been touched. The surface of its numerous mineral resources has scarcely been scratched. While grazing and agriculture are still far behind the possible development, it has vast regions which are unsettled and others which white men have not yet seen.

Brazil has more navigable rivers than any other country in the world. It is estimated that there are over 30,000 miles of navigable rivers in Brazil, 20,000 miles of which have a regular steamship service.

Brazil is blessed with immense and very beautiful waterfalls, from which it is estimated that 40,000,000 kilowatts can be obtained.

Rio de Janeiro, the capital, with a population of 1,431,688, is by far Brazil's most beautiful city, in the most gorgeous setting imaginable. It has a magnificent bay extending north about fifteen miles and from two

to seven miles wide, backed by mountains and dotted with numerous small islands. The Sugar Loaf Mountain rising to a height of 1200 feet above the bay, stands as a guard on the western entrance. Steamers pass the slopes and the granite peak of Corcovado. Just behind the bay rise the fantastic shapes of the Organ Mountains, including the five picturesque peaks known as "Dedos de Deus."

The city is worthy of its setting. Facing the sea is a promenade made of white marble and about six miles long. Most of the buildings are palatial, and the city squares are of great beauty, with bronze statuary, fountains, and verdure. These beautiful parks are kept in excellent condition and, with the open-air life of the cafes and restaurants, lend constant liveliness and gaiety to the scene. The city is one of the healthiest in the tropics, with a death rate of less than 20 per 1000.

The language of the country is officially Portugese, but there are a large number of Italians and Germans, especially in the southern states. It is estimated that there are over 750 German schools in Brazil.

Agriculture Now Predominant Industry

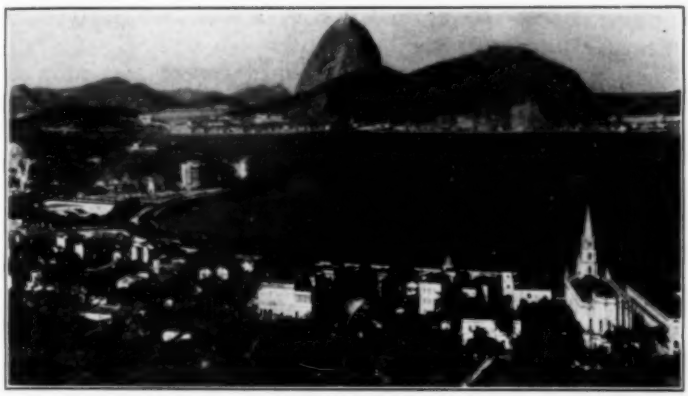
Brazil, like the other tropical countries, is primarily—for the time being—an agricultural country. The chief sources of its wealth are its agricultural crops. In 1924, 23,000 000 bags of coffee of 132 lbs. each were grown in Brazil. This constituted 82% of the world's production.

Brazil also produces the major portion of the world's cacao crop, and devotes constantly increasing areas to the cultivation of mandioca, corn, cotton, tobacco, and sugar.

Among the various agricultural crops of Brazil, the cotton, rubber, arrowroot, sugar, and vegetable oil crops are of great importance to the chemist. Every variety of oil bearing plant is grown in Brazil. The export of oil seeds from Brazil amounts to 157,000 tons per year. Brazil also produces a large amount of carnauba wax and also turpentine.

Minerals Important

The mineral wealth of Brazil is of great importance. Brazil is the largest exporter of precious and semi-precious stones. In addition, there is considerable coal, manganese, gold, iron, and oil. Among the non-metallic deposits, they are already exploiting granite, clays for the ceramic industry, mica, lime, abrasive substances, graphite, ochers, saltpeter, pyrites, mineral fertilizers, and asbestos. Diamonds, emeralds, pearls, and sapphires are mined on a large industrial scale.



HARBOR OF RIO DE JANEIRO

The following table will show a concentrated résumé of the mineral production:

Gold	100,115 troy oz.
Silver	25,591 troy oz.
Coal	400,000 metric tons
Manganese ore	359,651 metric tons
Zirconium sand	828 metric tons
Mica	97,002 pounds
Rock crystal	309 metric tons

The industrial center of Brazil is São Paulo, which has a large variety of cotton, textiles, tobacco, and sugar plants, as is natural for a country which produces the raw materials required for these industries. The government greatly encourages other industries by a high protective barrier of import duties.

Brazil has a well-developed textile industry. There were 357 textile plants in operation in 1928. These operated 2,584,050 spindles and 78,383 looms, employed 128,613 operators, and produced 760,000,000 yards of cotton cloth.

A large number of excellent modern cement mills are now in operation, supplying all of the home requirements.

Eighteen paper mills, with a combined capital of $30,000,000, have an annual production of 75,000 tons of paper. Two-thirds of the raw material used in these mills is imported wood pulp. The balance is

old paper, rags, rice straw, bamboo, banana fiber, and grass, and also to a small extent some native eucalyptus wood.

Brazil has well-developed footwear industries covering its entire home requirements and also leaving some for export purposes. The average plants are the most modern and up to date in the world. There are also extensive hat, furniture, and tobacco factories, and a rapidly growing pharmaceutical products industry. In addition, there are a large number of concerns manufacturing jams, jellies, and preserves, as well as hardware, matches, glassware, perfumery, candles, and paints.

All told, the Brazilian industries are estimated to have a production of $600,000,000 annually.

Excellent Transportation Facilities

Brazil has 21,000 miles of completed railways, which are partly under government control and partly owned by private companies. Well-established airplane lines connect the country with both Europe and the United States. This has greatly reduced communication time. Brazil was the first country to institute regular airship service with Europe. The Graf Zeppelin will have made six trips to and from Pernambuco by the end of this year.

The largest coffee export port in the world is Santos, where at one time as many as 15 ocean liners were loaded with coffee. This process is entirely mechanized; the coffee is transported from the warehouse to the hull of the boat by a very ingenious set of conveyors.

One of the most interesting cities in the entire world is Bahia, whose name in English means "The Bay of the Holy Savior of all Saints." It is the oldest city in Brazil, and was the capital in 1763. The city is very unique, having been built on two levels. The upper and lower levels are connected by excellent highways and by modern elevators, the tallest elevators in the world. The city has a population of about 300,000, and has over 500 churches, which are filled with beautiful medieval art treasures.

Natural Resources Being Developed

Both the past and the present Brazilian governments have done everything possible to develop the country's natural resources and to encourage the establishment of industries utilizing the immense wealth of the country.

In practically every state there are now well-equipped trade schools with all facilities for studying and utilizing the natural resources of the

region. There are several schools specializing in vegetable oil and fats, others in sugar, mining, forestry, etc. The libraries and laboratories of the schools have been patterned after the best in the world, and I believe that they are an improvement on any existing school in that particular field.

Brazil is a paradise for the nature lover and for the one who has vision and ambition to harvest the forces of nature for the benefit of mankind.

. . . . . .

Instead of enumerating the natural resources, the imports and exports of each Latin-American country, it may be better to give a summary of the United States trade with Latin America, which will emphatically point out the fact that Latin America is primarily a producer of raw materials such as are now used in our basic industries—and that commercial relationship with Latin America will continue for all time to come.

America Seeks New Markets

After having our industries expanded far beyond home requirements, we came to the realization that prosperity in the industrially and agriculturally over-developed United States absolutely depends on our ability to market our surplus commodities in foreign countries.

Europe is daily becoming less of a consideration from that point of view. Chemicals, iron, and steel can be produced more cheaply in Europe than in the United States. Russia can produce cheaper agricultural products and is nearer to the European markets, which are exchanging their manufactured goods for Russian agricultural commodities.

The other large market of the future is the Orient. Turbulent political conditions will make it uncertain for a long time to come. Moreover it will only be possible to market our excess commodities there on a credit basis.

The only continent in the world which is able to pay for her purchases and where political conditions are reasonably safe and sane is Latin America, which is now purchasing about 35% of our total exports. Latin America is the best customer the United States has. In 1929 she purchased about $150,000,000 worth of automobiles alone from this country. On the other hand, the United States is one of the chief markets for Latin America. Thirty-six per cent of their exports come

to this country. The United States is very closely affiliated with Latin America and has over $6,000,000,000 invested there in mines, public utilities, plantations, and industrial plants.

The United States' imports from Latin America for the year 1929 amounted to $1,106,917,000 while the exports from the United States for the same period amounted to $972,900,000.

The following table will show the leading exports of the United States to Latin America, and the succeeding table will show the leading imports of the United States from Latin America:

EXPORTS

Machinery	$161,268,000
Electrical	34,087,000
Agricultural	44,605,000
Industrial	73,508,000
Office appliances	9,068,000
Vehicles	160,800,000
Automobiles	139,781,000
Petroleum and products	89,238,000
Gasoline	40,827,000
Kerosene	10,007,000
Lubricating oil	13,890,000
Gas and fuel oil	15,551,000
Crude oil	1,999,000
Iron and steel	88,945,000
Semimanufactures	16,736,000
Steel-mill products	42,293,000
Advanced manufactures	29,916,000
Cotton manufactures	65,808,000
Cloths	40,233,000
Yarns	9,611,000
Hosiery	3,301,000
Grains and preparations	52,944,000
Wheat flour	27,400,000
Wheat grain	10,723,000
Rice	4,353,000
Corn grain	2,141,000
Wood and manufactures	42,476,000
Unmanufactured	4,124,000
Sawmill products	27,002,000
Boards and planks	24,932,000
Manufactures	11,350,000
Edible animal oils and fats	28,178,000
Lard	27,117,000
Chemicals	22,299,000
Industrial and specialties	11,367,000
Medicinals	10,026,000

EXPORTS (*Continued*)

Meat and dairy products	20,219,000
Meats	12,284,000
Dairy products	7,935,000
Rubber manufactures	21,865,000
Auto tires and tubes	11,704,000
Paper and manufactures	9,371,000
Fruits	8,365,000
Bituminous coal	8,160,000
Copper and manufactures	9,403,000
Leather, unmanufactured	9,509,000
Leather manufactured	8,890,000
Tobacco and manufactures	6,276,000
Silk manufactures	6,650,000
Paints and varnishes	7,144,000
Photographic goods	5,443,000
Vegetables and preparations	4,689,000
Musical instruments	10,692,000
Naval stores	4,977,000
Clays and products	4,910,000
Eggs in shell	3,723,000
Glass and glassware	3,451,000

IMPORTS

Coffee	293,060,000
Petroleum and products	139,369,000
Sugar	160,103,000
Copper	102,334,000
Fruits	39,352,000
Hides and skins	48,746,000
Flaxseed	44,176,000
Nitrate	34,466,000
Cacao	24,142,000
Leaf tobacco	19,224,000
Molasses	12,859,000
Vegetables	12,046,000
Meats	17,073,000
Wool, raw	22,463,000
Chicle	6,619,000
Lead	11,870,000
Sisal	12,765,000
Iron ore	5,057,000
Quebracho extract	3,783,000
Chemicals	3,962,000
Fish	2,631,000
Nuts	4,252,000
Wood and manufactures	4,165,000
Tobacco manufactures	3,087,000

IMPORTS (*Continued*)

Furs	5,473,000
Rubber, crude	4,322,000
Bauxite	1,703,000
Platinum	2,831,000
Casein	2,698,000
Cotton, raw	7,419,000
Inedible vegetable oils	1,751,000
Manganese	1,481,000
Spices	2,100,000
Bones, hoofs, horns	1,481,000
Istle	1,274,000
Diamonds	1,810,000
Sponges	1,092,000
Quebracho wood	1,037,000
Guayule	545,000

These figures will clearly emphasize the opportunities existing in the Latin-American countries. All these countries are immensely wealthy in natural resources, the surface of which has not yet been scratched. I am satisfied that in the next decade greater industrial development will take place in Latin America than has been witnessed in North America.

Latin America as a whole has a healthy climate. It is pleasant even in the most tropical countries, because no matter how warm it is during the day, the evenings are cool; and, due to the low humidity, one feels the heat less there.

Attractive Living Conditions

One's life and property are safe, and he can devote his entire energy to his work. Food is cheap and living very pleasant and comfortable. The homes are large—gardens and flowers are available—and even those of modest income can have more than mere necessities. The social life there also is more intense, as there is close co-operation between various nationalities.

In Valparaiso, Buenos Aires, or Rio de Janeiro one may find English and American settlements with American stores and schools; so that even without speaking the native tongue, one may get along.

Imagine the possibilities in countries which now import $900,000,000 worth of finished products annually but which tend to produce these commodities at home—a continent which exports over a billion dollars

worth of raw materials, used in other countries in the manufacture of finished commodities.

Latin America in general and South America in particular will witness an industrial development unparalleled in the history of the world. Nature was very generous in supplying unsurpassed climate and immense wealth in natural resources.

The population as a whole is ambitious, enterprising, and immensely patriotic. Chemists and engineers who are able to blend their knowledge and experience into a homogeneous entity with the Latin-American characteristics will find greater opportunities and higher rewards there than at home.

"HYDROELECTRIC POSSIBILITIES"

Vocational Meeting

For the first time, chemical industry will have a place on the program of The American Vocational Association. The meeting is to be held this year December 10th to 12th, inclusive, at the Hotel Pennsylvania.

The educators will be addressed by two industrialists, whose subjects will be "Some Present Day Tendencies in the Chemical Industries" and "What the Industry Is Doing and Might Do to Meet Present Tendencies."

One speaker from the vocational group will be assigned the topic, "What the Vocational Schools Are Doing and What They Might Do to Meet Present Tendencies in the Chemical Industries."

An Opportunity for Public Service

By Bernard L. Oser

A chemist whose work has lain along the lines of public health discusses the responsibility which chemists ought to assume in protecting the public from charlatans.

IN SPITE of the antiquity of the science of chemistry and its very real relation to the public welfare, the profession of chemistry has failed to impress itself upon the public consciousness to an extent commensurate with its importance. This may possibly be attributed to the fact that the chemist is called upon to perform such varied functions in many different fields of activity that the popular mind is unable to visualize his relation to the communal welfare in the same sense that it pictures the physician as a guardian of the health, the lawyer as a defender of justice, or the engineer as a builder. Whatever the cause, it is certain that the medical and legal professions have achieved public recognition, whereas the chemist is still looked upon as a white-frocked gazer into test-tubes, a sort of modern sorcerer.

One of the greatest services the chemical profession could perform, and one which would at the same time crystallize and enhance its position in the community, would be the extermination of chemical charlatans. Medical societies and bar associations have coped successfully with the job of exposing quacks and shysters who capitalize the layman's lack of specialized knowledge. But because of the absence of concerted effort within our own profession, we have in our midst self-styled food experts, various foreign chemists with "secret formulas," and so on.

Particularly objectionable is the profusion of so-called nutrition specialists on the air these days. They are not chemists, they are not doctors. Where do they acquire the right to advise the public on matters pertaining to diet? Unless genuine chemists come to the rescue, how

can the guileless public distinguish between the experts and the fakers? Is it any wonder that the latter step in to exploit ignorance when no individual or group qualified to speak with authority stands ready to guide the unwary?

Advertising Policies

In these days of high pressure advertising directed at the ears as well as at the eyes (though often assailing the olfactory organ), the public is more than ever in need of competent guidance. There are those who believe that the code of ethics which forbids the use of a professional man's name in advertising is now obsolete. Whatever brief one holds for this position, the consequence of the taboo has been that advertising men, more enterprising than scrupulous, have created their own coterie of experts—because genuine authorities in scientific fields were too fearful of their reputations.

It is the duty of each profession to keep its own house in order. As a protection to the public against chemical quackery, the American Institute of Chemists, the organization representing the chemical profession in this country, should assume the responsibility of driving the charlatans from the public press, from the broadcasting studios, and from the mails. Though it is admittedly not a simple job, there are successful precedents in other professions to guide us. Some of the means for achieving this are the organization of a committee of the Institute to pass upon advertising and, if it sees fit, to grant public approval, instead of allowing the names of individuals to be exploited. In connection therewith a publicity campaign could be inaugurated for the purpose of acquainting the public with the function and qualifications of professional chemists. Another step in the right direction would be the passage of legislation requiring that the qualifications of experts be stated along with their names when the latter are used in advertising.

The topic should properly be discussed in open forum in the Institute because it not only presents the much-needed opportunity for public service but it affords a means whereby the public can comprehend the rôle of the chemist as a guardian of its welfare.

CONTEMPORARY THOUGHTS

The Chemist in Industry

An editorial from the *Industrial Chemist*

ANYBODY comparing the personnel of the high administrative posts in chemical industry in England and in Germany is immediately struck by the great difference between the two countries. In Germany these posts are almost invariably filled by men of high scientific and technical attainments, while in this country the commercial and financial interest predominates almost to the exclusion of the scientific. An inquirer commenting on this marked contrast would be glibly told by the average company director that the chemist is not a business man, and is consequently unsuitable for such posts. This criticism can only mean either that the chemist is so lacking in practical common sense that he is incapable of understanding such questions as costs of production, supply, and demand, and the work of administration of men and material; or, alternatively, that he has not had the opportunity of studying the methods of industrial organization in general and of his own industry in particular.

The first alternative casts an unwarranted slur on the intelligence and adaptability of the young men of this country, who have always proved themselves able to hold their own with those of any nationality, and we must therefore look into the second alternative as the cause of the supposed deficiencies of the chemist.

It has long been a bone of contention whether or not the training a chemist receives at our universities is too academic, and many think that a larger portion of the time should be devoted to the industrial aspects of science. The enormous expansion of scientific knowledge in the last few decades has made the three or four years which is all the average student can afford for training and study none too long to absorb a reasonable knowledge of his subject and of the methods of original investigation.

It is open to grave doubt whether anything beyond the first general principles of handling chemical problems from an industrial point of view can be learned outside the actual factory. Whether or not this is the case, it is an obvious fact that it must have been in the actual works that the

business man has gained the experience which gives him his alleged superiority over the academically trained chemist, and the latter should be given the same opportunity. Unfortunately, this is too often not the case. In a large and highly organized establishment the young chemist is drafted into a particular section of the work and knows very little of what goes on in other departments or of the relation his work bears to the organization as a whole. In many cases there is no free discussion of problems between one section and another, and a man's very proficiency in his own work often is made the excuse for keeping him in the one groove permanently. The large industries, however, are slowly learning that such a policy does not react favorably on their business, and a junior chemist is getting a better chance than formerly of working his way up. In smaller concerns the state of affairs is usually worse, for the chemist meets with antagonism from both the office staff and the foremen, an attitude which may be encouraged by the manager if he does not happen to be a scientific man.

To such an absurd extent is the attitude of "keeping the chemist in his place" persisted in in both large and small works that often even in the matter of ordering laboratory supplies the chemist has no control after sending in a requisition for what he needs. When the goods arrive, he may find that the quantities are cut down or the descriptions altered by men to whom the very names of the goods are meaningless.

Until manufacturers take their chemical staff into their confidence and give them a working insight into the administrative and commercial side of their business, it is absurd to hope that the chemist can possibly be the help that he is expected to be and should be.

Chemists Out of Employment

Excerpts from an article in the *Canadian Chemist and Metallurgist*

A SURVEY of those unemployed seems to show that the following faults have come to light under the stress of conditions. Failures possess or lack:

(1) Inadequate or undesirable mental background for superimposed professional training.

(2) No natural or acquired aptitude, understanding, or sympathy toward problems of commercial life.

(3) No versatility or vision in outlook.
(4) No adaptability to various forms of work, chemical or otherwise.
(5) Insufficient personality and character.
(6) Lack of adequate training of the right type.
(7) No professional friends or connections of value.
(8) Excessive and rather selfish individualism.

Professional training should not make young people think that if conditions are such that they cannot secure employment in the type of work for which they believe they have prepared themselves they should do nothing and have a grudge against the world.

The business of the trained professional person may be to use that training, but if necessity commands, it is distinctly not an indication of wisdom or strength to refuse to compete in non-professional work. Most of those who are cast off in staff reductions are men who cannot be utilized in the business of the organization in any other way than the one in which they were employed. If, for example, laboratory work ceases, they are through. One would suppose that some of them could compete in production operations, at least as operators, or if they know so much about everything, they might be able to sell or assist in the creation of a demand for the products of their industry.

A brighter side of this picture may be seen. There are many who, through no particular fault of their own, find themselves forced to change employment. The character of the individual is reflected in his reaction toward his necessities, and there are chemists who needed the shock of sterner times to bring out those qualities that will make them more successful in future. Among chemists who have training that is real, and an education that was a preparation in character building as well as in science, there has been very little disturbance, except that fresh graduates may be compelled to wait a moment for their professional opportunity.

Even in the past month we have heard of two cases in which good men, who have suddenly found themselves out of work owing to staff reductions, have almost immediately secured better positions, and a third case in which a "victim" has developed an entirely new and, from present indications, highly successful, system of selling certain types of chemical plant.

Ambassador to the World

By D. D. Jackson

The story of a chemist who has achieved scientific and educational importance without losing his ability to dine at his ease in the presence of any number of footmen. Marston T. Bogert, antithesis of the absent-minded professor.

IF YOU see a distinguished looking gentleman hurrying through the Grand Central Station toward the State of Maine Express—a distinguished looking gentleman carrying a fishing rod, a butterfly net, and a bag from which the tails of evening clothes protrude, he is probably Dr. Marston T. Bogert, professor of organic chemistry at Columbia. If he is followed by a porter burdened with two unusually heavy suitcases, the gentleman is sure to be Dr. Bogert. The suitcases will be full of ponderous books on chemistry, and the professor will be on his way to his summer estate at Belgrade Lakes, Maine.

. . . . . .

Marston Taylor Bogert, like that other member of an old Knickerbocker family and his own distant relative, Colonel Theodore Roosevelt, was thin and sickly as a small boy. Like Colonel Roosevelt, he did not intend to remain thin and sickly. He went to a gymnasium and took regular exercise. The result was a body which carried him to many athletic distinctions. Even today, at the age of 63, Dr. Bogert is an able tennis player.

Dr. Bogert's entrance into the chemical profession was a last-minute inspiration, an inspiration which was fortunate for the chemical profes-

sion, but which did not shape particularly the life of Dr. Bogert. He would have been a success at whatever he undertook.

In the last year of young Bogert's stay at the famous old Flushing Institute, one of the masters asked if any of the boys would like to take a preliminary course in chemistry. He had a little room fixed up as a laboratory. Among those who took the course was Marston Bogert.

The experiments performed in this elementary course were simple—the etching of glass with hydrofluoric acid, the combining of iron and sulphur into iron sulphide—but the young student was deeply impressed, more deeply than he realized at the time. He went on to college, where he won numerous academic honors and received also recognition of his qualities of personal leadership. In his freshman year he was captain of the class crew that beat Harvard. For several years he was college tennis champion; and he won athletic palms in such diversified fields as shot putting, football, pole vaulting. He was chosen one of the "three most deserving students of the graduating class." He was president of his class; and he was chairman of the entire undergraduate body at the installation of President Low.

In every way Bogert was marked as the member of the class who ought to succeed. In spite of this handicap he did succeed.

When he was graduated from college, where his chief interest had been in languages, he was offered a position by Professor Bojesen, of the German department. The offer, was a flattering one, and Bogert was tempted; but more and more, as he pondered his future career, he remembered the little laboratory in his school. He saw then that he could not be happy in any line but chemistry.

Declining the assistantship in languages he reentered the college to take another full four year undergraduate course, this time in the School of Mines. Professor Bogert has never regretted these eight undergraduate years. They introduced him to fields he would never have tried had he begun specializing at once.

After eight years as an undergraduate at Columbia, that institution had got its tentacles rather completely around the young student. Resigning a fellowship which had been awarded to him, and resigning also a position as a chemist for a large manufacturing concern, he stayed on at Columbia as assistant in organic chemistry. Promotion through the various grades came quickly. Ten years after graduation, he was appointed professor of organic chemistry, the first Columbia ever had.

Following Dr. Bogert through his many interests is hard work. He has left simultaneous tracks in many different chemical kingdoms. Nor is he by any means satisfied with the knowledge he has acquired. He

still regards himself as an undergraduate studying the great truths of nature. No one knows particularly why—for Dr. Bogert is one of the most worldly men in the chemical profession. It is in the world that his greatest fame and achievements lie.

Dr. Bogert is an admirable figurehead. The world wants figureheads, needs them, in fact, and Dr. Bogert could be a notable success by sticking to this job alone. He prefers, however, to do things.

Unfortunately for him the world has found out about his willingness to work, and seizes upon him eagerly for all sorts of committees and commissions. President Roosevelt appointed him a member of the first conference on the conservation of natural resourses, also of the second conference on the same subject, with the governors of all our states and territories. At the latter he presented addresses in all four divisions of the conference—water, land, forest, minerals—and pointed out how chemistry can assist in the solution of the various problems therein arising.

This display of versatility completed his undoing. Since then he has been swamped with positions on advisory committees, congresses, consulting boards, editorial boards, fraternity councils, museum directorates, research councils, American and foreign chemical societies. Most men would have come through it haggard and worn. Dr. Bogert has thrived. His reservoir of surplus intellectual energy enables him to throw himself with enthusiasm into all his extensive activities.

Perhaps Dr. Bogert's greatest contribution to chemistry is the work he did during his two years as President of the American Chemical Society. At that time the industrial chemists threatened to split away from the parent organization to form a society of their own, a society whose activities would coincide more nearly with their own interests. To meet this crisis Dr. Bogert conceived and carried out the plan which resulted in the building of the present structure of the American Chemical Society. The Society was divided up into sections according to interests. The *Journal of Industrial and Engineering Chemistry* was established, on such a stable foundation that it became a notable success. Industrial chemists remained part of the main body; and the Chemical Society, appealing with equal force to all kinds of chemists, built up the greatest scientific organization the world has seen.

Dr. Bogert's influence, however, has been more than national. He went to Czecho-Slovakia as a representative of the Carnegie Foundation for Peace and became the first American visiting professor to that country, lecturing in English at the ancient Czech University, which was founded 150 years before Columbus discovered America. The Czechs

took to Dr. Bogert. He was guest of honor at a government dinner and was made a commander of the Order of the White Lion. To Mrs. Bogert were presented superb examples of Bohemian glass work.

Another international honor was the presidency in 1912–1913 of the English Society of Ch mical Industry. In fifty years the only American presidents were Chandler, Nichols, Bogert, Remsen and, recently, Arthur D. Little. Dr. Bogert is now senior American president.

A meeting of the French Society of Chemical Industry, held in Paris about three years ago, was concluded with a grand banquet in the Hotel Claridge in the Champs Elysée. The thirty nations represented had to choose a representative to speak for all the delegates. They acted without hesitancy. The speaker was Dr. Bogert.

This incident is perhaps typical. When an organization needs someone to carry off a public situation capably and well, the first thought is apt to be, "Let's see if we can't get Bogert." His name carries the prestige that goes with accomplishment; but he can be counted upon not to rest on his fame. He is one of the best after-dinner speakers in New York.

Public applause, however, has not made Dr. Bogert pompous or self-important. Perhaps the best indication of this is his great popularity with his students.

Thus far, Dr. Bogert's ever-increasing activities have not dulled the edge of his enthusiasm—although he sometimes says plaintively, "I have too many interests." He has never, however, acquired too many interests for his capacity. He is tremendously well up on his own chemical fields—the complicated subject of perfumes, pharmaceuticals, and dyes; and he has found time to prepare more than 250 papers embodying the result of original research, in addition to many reviews, popular articles, and addresses.

Association with Dr. Bogert leads to the conclusion that he has fun. His present life is certainly ideal. As a boy it was his ambition to own 100 acres in the country. Now, at his summer home in Maine, he has more than 1000 acres touching three different lakes. There he has spent his vacations for the last twenty-five years, fishing, hunting, living in the outdoors—and receiving notices of board meetings.

Dr. Bogert's ultimate fate is easy to predict. He will eventually become chairman of a committee for improving the condition of Valhalla. Under his direction the Future Life will regain some of its lost popularity.

Chemistry in Canada

By E. T. Sterne

A noted Canadian chemist briefly outlines the condition of the industry and prospects for the profession in his country.

IN CONSIDERING the position of chemists and chemistry in industry in Canada, there are several conditions peculiar to this country that must be taken into consideration.

While a spirit of healthy nationalism is struggling for expression, and Canada is endeavoring to establish a complete national unit in manufacturing as well as in agriculture, the closeness of conditions to those in the United States and the large American investment in Canadian industry have had a marked effect on the research and development programs of Canadian chemical industries.

Much of the research work is left to the American laboratories of associated organizations. Only what might be termed an interpretative staff is maintained in Canada. Then again, there are large organizations which are essentially Canadian and which yet do all their research work in the United States. Some Canadian firms, however, are definitely carrying out a real research program and are consequently meeting with deserved commercial success.

Research Facilities

A distinct feature of the development of the last few years has been the establishment of many small branches of the fine chemical industry of other countries, notably pharmaceuticals and perfumes. These have met with marked success, a success which has also been enjoyed by the small manufacturers of industrial and structural chemical specialties.

The reaction of industry in general to investigation and research is very encouraging.

In addition to the numerous competent custom research laboratories, the National Research Council laboratories, the various Federal and Provincial Government laboratories, the Forest Products Laboratory, and the Ontario Research Foundation (an organization in which industry has an equal partnership with the government) are all bringing to industry the practicability of applying science to industry in general.

When the importance of science in industry becomes fully recognized, the biggest outlet for properly equipped, well-balanced scientific minds will be found in the paths that lead to the executive positions in industry.

Business Factors

During the boom period mergers were very much in fashion, not so much that economies of operation or administration might be effected and lower costs be obtained for consumers, but that a maximum of water might be injected and easy money obtained by financiers. The situations thus created must now be corrected by the scientific effecting of the economies which should have been the logical foundations for the mergers in the first place; and the chemist or other scientifically trained mind should find here his golden opportunity. Already in some of our larger industries, such as the pulp and paper and the mining and smelting industries, the possession of a trained mind is recognized as an asset in handling the normal affairs of business. It is only a matter of time until the same is true in our general industry.

To take advantage of this opportunity, however, the chemist or engineer must be more than just a member of his profession. He must realize that it takes more than good chemistry or sound engineering to make a successful industry. It is also true that a training in economics and business may be more important to the majority of our future chemists than some of the more advanced courses now being taught.

More Than Chemistry Necessary

Development, production, sales, and finance must be recognized as the four necessary wheels on which industry must run. The scientific mind which has a tendency to depreciate the importance of sales and finance cannot attain its full usefulness. To the scientifically trained mind of capacity that has poise, vision, energy, and capacity to co-operate belongs the future in all lines of industry in Canada. While the present condition is not bright, it has only served to emphasize the importance of facts as the price of survival. Where knowledge is sure to be power,

the chemist and engineer have a bright future—a particularly bright future in Canada, if such knowledge is applied in a broad, comprehensive way to the problems of development before us.

Canada has large mineral resources, usually occurring in complex ores that require much research to evolve economical winning processes. While much work has been done in the way of increased production both industrially and agriculturally, much remains to be done toward better utilization of products. This latter branch of development offers an attractive field for the chemists of the future.

It is well recognized that there is much waste in the present methods of using raw materials. Often, also, there are cheaper sources of articles than those at present used. Methods of conversion are also subject to improvement, and markets for many products could be broadened.

I have faith in our country and faith in our Canadian chemists and engineers. Consequently I am optimistic as to the future if we have the capacity to take advantage of the multitude of opportunities for service that will continually present themselves. I feel that Canada will be adequately served by her technical men to advance her fine arts and to develop her extensive natural resources.

Positions Wanted

The following chemists are available for positions. Further information will be furnished upon application to the American Institute of Chemists, 233 Broadway, New York, N. Y.

101-XX	Chemist experienced in analysis of metals, rubber, paper. Some research experience.
101-QT	Ph.D. with wide experience in food products. Head of laboratories of various canning companies.
101-PQ	Chemistry professor. 15 years' teaching experience.
101-IN	Chemical engineer experienced in high vacuum and the chemistry of air gases.
101-ZN	Research and plant chemist experienced in cement, leather, high explosives, acids, fertilizers.
101-MO	Research chemist experienced in explosives, dye intermediates, acids.
101-HW	Paper chemist, research and development work.
101-DP	Recent graduate, industrial position.
101-ID	Chemical engineer, nine years' experience plant work and management.
111-NQ	Chemist, 11 years' experience. Research, analysis of metals.
111-OX	Organic chemist, experienced as chief chemist and director of research.

BOOK REVIEWS

Fighting Disease with Drugs. A symposium, edited by JOHN C. KRANTZ, JR. *Williams and Wilkins Company.* $2.50.

This volume, in twelve chapters, a preface, and an introduction, includes a philosophical discussion of the origin and function of pharmacy, its development, from the dawn of recorded history, and an outline of current pharmaceutical practice.

With a book of this sort there is always a certain wonder that it has been written at all. To compress into 230 pages the history of three thousand years, to add the details of the past half-century in pharmacy, and finally to secure the collaboration of a dozen men, each an authority in his field, is a labor that dwarfs any judgment of the product. The lay reader will be rewarded for the perusal of this work. It will stimulate his appreciation of a field in which science and art must be rigidly controlled in the public interest.

The professionally conscious chemist will again become aware of his participation in producing public welfare, of a responsibility to the public, and of a new slant on the relation between chemist and pharmacist. We learn from this book that pharmacy is really the parent of chemistry. The point is at least debatable, although all history tells us of men for whom the habit of mind that we call chemistry, produced great results. KARL M. HERSTEIN

An Introduction to General Chemistry. By WILLIAM FOSTER. *Princeton University Press.* $3.50.

The revised edition of Dr. Foster's book embodies the latest chemical developments and also improvements growing out of the criticisms and suggestions brought forth by the original book. There is considerable simplification in the text. The inevitable confusion arising from the discussion of equivalent and combining weights is reduced as much as possible by deferring presentation of this subject until after that of valency. Arrangement of the problems also has been simplified, though in this connection we must deplore the inclusion of a table of logarithms. Chemists use mechanical logarithms, and so ought the students.

Dr. Foster is generous in his treatment. In his 849 pages he includes a number of full page illustrations, short biographical sketches of noted chemists, and even the latest industrial practices.

It is unfortunate that the competition of cheaply written, cheaply made beginners' textbooks makes it impossible to give a well-written book an appropriately good physical make-up. The Princeton University press have done their best with *An Introduction to General Chemistry*, but many of the half-tones are poor, and the binding is inferior. Yet the text of the book is of such quality that the student would like to keep it for reference during the rest of his college career in chemistry. E. L. G.

Civil Service Examinations

THE United States Civil Service Commission announces the following open competitive examinations:

ASSOCIATE CHEMIST (INDUSTRIAL HYGIENE INVESTIGATORS)
ASSOCIATE CHEMIST (ANY SPECIALIZED BRANCH)
ASSISTANT CHEMIST-PETROGRAPHER
ASSISTANT CHEMIST (ANY SPECIALIZED BRANCH)

Applications must be on file with the U. S. Civil Service Commission at Washington, D. C., not later than December 30, 1931.

The examination is to fill vacancies in the Bureau of Mines, for duty at Pittsburgh, Pa., New Brunswick, N. J., and elsewhere in the field. Vacancies in other branches of the service will also be filled from those examinations.

The entrance salaries for the associate positions range from $3200 to $3800 a year, for the assistant positions from $2600 to $3200.

Competitors will not be required to report for examination at any place, but will be rated on their education, training, and experience, and on their thesis or published writings.

Full information may be obtained from the United States Civil Service Commission, Washington, D. C.

The United States Civil Service also announces the following-named open competitive examination:

PRINCIPAL PHYSIOLOGICAL CHEMIST

Applications must be on file with the U. S. Civil Service Commission at Washington, D. C., not later than December 1, 1931.

The examination is to fill a vacancy in the Bureau of Construction and Repair, Navy Yard, Washington, D. C., and vacancies occurring elsewhere, for duty in Washington, D. C., or in the field.

The entrance salaries range from $5600 to $6400 a year.

OUR AUTHORS

"The Consulting Chemist"

Thomas A. Wright, like many another metallurgist, began his chemical career as an assayer. After two years as chief assayer with the U. S. Metals Refining Company, he branched out into other lines of chemistry and in 1908 joined the organization of Lucius Pitkin, Inc., consulting chemists. He is still associated with this company, now as chief chemist and secretary. His particular specialties: precious metals, copper, lead, associated metals. He is a Fellow of the Institute.

"The Chemist in Europe"

H. O. Chute went to England six years ago with the American Institute of Chemical Engineers, went again this year to the Jubilee of chemical industry, and now tells the readers of *The* CHEMIST about the changes that have occurred in the meantime. Older than our picture shows him, Mr. Chute is a familiar figure at The Chemists' Club, where he lives. Of an inquiring mind, Mr. Chute is a keen observer and a good listener. He therefore possesses one of the widest funds of general information of any living chemist.

"The Chemist in Public Health"

S. M. Weisberg, F.A.I.C., Ph.D. (Hopkins), finished his college work at Tufts, then accepted a position in the nearby textile industry. Biological chemistry proved more alluring. He joined the staff of chemists of the Department of Agriculture, where he worked on gluconic acid and molds. Now Dr. Weisberg is employing his knowledge of the newest branch of chemistry as industrial research fellow in the laboratories of the National Dairy Products Company.

Teacher and Executive

William Foster, F.A.I.C., Ph.D., was graduated from Vanderbilt, came north to Princeton for his graduate study. After receiving his

doctor's degree, he spent one year on the faculty of the Central University of Kentucky. He then returned to Princeton, where he has been ever since.

One of our most literate chemists, he is a contributing editor of the *Journal of Chemical Education* and a contributor also to English and German periodicals. He is the author of five textbooks and of *The Romance of Chemistry*. Colleagues at Princeton regard him as one of the University's ablest teachers and administrators.

United States Expert

For referring to him last month as an American expert on the chemical industry of South America, **Henry Arnstein** reproves us as follows: "Latin Americans object when we refer to ourselves as Americans. They claim, and justly so, that they also are Americans. In dealing with them it is advisable to refer to ourselves as citizens of the United States.

"In Latin America people as a rule are very formal and pay a great deal of attention to outward appearance, ceremony, and expression. When one deals with them and refers to himself as an American, they feel slighted. Therefore, that expression should always be avoided."

Southern Industrial Leader

Theodore Swann was a Tennessee farm boy who had energy and ideas. Successful at selling other peoples' commodities, he decided that he would be even more successful selling his own. He was right. Now he is president of Swann Industries, Inc., an organization to which he has transmitted some of his own driving force. In the few moments when he is not working, traveling, or making speeches, Mr. Swann engages in sports which also move fast: flying, shooting, horseback riding.

"An Opportunity for Public Service"

Bernard L. Oser, F.A.I.C., Ph.D. (Fordham), has dealt principally with chemistry in its relation to the health of mankind, first as assistant in physiological chemistry in Jefferson Medical College, then as biochemist in Philadelphia General Hospital. After four years as

instructor in biochemistry at the graduate school of medicine at the University of Pennsylvania, Dr. Oser joined the Food Research Laboratories, Inc., where he could use his executive ability as well as his scientific knowledge. He is now the laboratories' efficient assistant director.

Noted Educator

Daniel Dana Jackson, F.A.I.C., Sc.D. (Pittsburgh), was chemist and director of laboratories for several municipal water departments before Columbia University got him in 1911 as lecturer on sanitary engineering. Columbia held on to Dr. Jackson, promoted him through the various grades to professorship, and in 1918 made him executive officer in the department of chemical engineering.

Like Dr. Bogert, about whom he writes, Dr. Jackson likes fishing, golf, also likes art galleries. His chemical specialties are water, sewage, industrial processes, and colloids. Dr. Jackson's great regret in life is that his present duties keep him busy during the moose hunting season.

Canadian Chemist

E. T. Sterne, F.C.I.C., has practised his profession on both sides of the water, in Canada as chief chemist of the Imperial Munitions Board plant, in London as foreign technical representative with the Shawinigan Water and Power Company. Now he heads the Sterne consulting firm in Brantford, Ontario. He is a past president of the Canadian Institute of Chemistry, also of the Ontario Association of Professional Engineers.

INSTITUTE NOTES

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Brooklyn, N. Y.

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HOWARD S. NEIMAN, *Secretary*
233 Broadway
New York City

J. F. X. HAROLD, *Treasurer*

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New York Representative KARL M. HERSTEIN

Washington Representative DANIEL F. J. LYNCH

National Council Notes

A meeting of the National Council was held on October eighth at The Chemists' Club, with the following councilors and officers present:

Messrs. Arnstein, Cayo, Crossley, Gordy, Harold, Herstein, Hill, Lynch, Moody, Neiman, Zons.

Six Fellows, three Associates, and two Juniors were elected to membership in the Institute.

Mr. Herstein read the report of the committee appointed to consider Institute policies. The committee recommended that the Institute's chief efforts be directed toward increasing the membership. As a step in this direction, it was decided to ask the chairman of the membership committee to submit tentative plans to the next meeting of the council.

A tentative report of the budget committee was also discussed.

Secretary Neiman was directed to note the Council's appreciation of the motion passed by the Pennsylvania Chapter relative to the services of the councilors.

New Members

The following were elected to membership at a meeting of the National Council of the Institute, held on October eighth:

FELLOWS

ROBERT VAUGHAN BROWN, Plant Manager, Calco Chemical Co., Inc., Newark Works, Newark, N. J.

LYLE A. CLOUGH, Organic Research Chemist, Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.

RUSSELL CASPER ERB, Professor of Chemistry and Head of Dept., Philadelphia College of Osteopathy, 48th and Spruce Streets, Philadelphia, Pa.

DANIEL DANA JACKSON, Executive Offi-

cer & Professor, Department of Chemical Engineering, Columbia University, New York, N. Y.

WALTER S. TYLER, JR., Research Chemist, Tide Water Oil Co., Bayonne, N. J.

HERMAN DELIUS WEIHE, Junior Chemist, Bureau of Chemistry and Soils, Department of Agriculture, Washington, D. C.

ASSOCIATES

EDWARD LEE GORDY, Editor, *The* CHEMIST, 233 Broadway, New York, N. Y.

FERDINAND FRANCIS EMANUEL KOPECKY, Chemist, Bakelite Corporation, 230 Grove Street, Bloomfield, N. J.

WALTER LORD OBOLD, Head of Dept. Biological Sciences, Drexel Institute, Philadelphia, Pa.

JUNIORS

HARRY P. DALALIAN, 118 Linwood Avenue, Philadelphia, Pa.

HUGH AUGUSTUS D'AMATO, 125 North Third Street, Jeannette, Pennsylvania.

FERDINAND PHILIP HELLER, Graduate Scholar, Cobb Chemical Laboratory, University, Virginia.

HERBERT G. WISEMAN, Assistant Chemist, Department of Agriculture, Experiment Station, Beltsville, Md.

The following Associates were transferred to the rank of Fellows:

CHARLES A. MARLIES, Tutor, Department of Chemistry, College of the City of New York, New York, N. Y.

MARY AUGUSTA ROLLAND, Research Chemist, Reed and Carnrick, 157 Van Wagenen Avenue, Jersey City, N. J.

New York Chapter

The first regular meeting of the 1931–1932 season was held at The Chemists' Club on the evening of Friday, October ninth, Chairman Frederick Kenney presiding. The address of the evening was delivered by Edward L. Gordy, editor of *The* CHEMIST, who told about plans for the publication. In the discussion of the talk, a number of members of the Institute expressed their ideas concerning the proper editorial policy.

Pennsylvania Chapter

A meeting of the Pennsylvania chapter was held at the Engineers' Club on Tuesday evening, October sixth, Chairman Franklin D. Jones presiding. Mr. Cayo again spoke on the definition of a chemist and elaborated his last month's council report of the reorganization of the board of editors of *The* CHEMIST.

The address of the evening was delivered by Professor Floyd T. Tyson of Temple University, who spoke on chemical education, particularly as regards the education of high school teachers of chemistry.

During the discussion of the paper, Dr. Shinn stated that the Institute would in the near future be invited to a symposium on chemical education to be held under the auspices of the Senate of Chemical Education.

BENJAMIN LEVITT, *Secretary*

NEWS

Wilder Bancroft gave a talk on reversible coagulation in living tissues to the New York Section of the American Chemical Society at The Chemists' Club on October 16th.

Philip G. Stevens has returned from a year's study abroad to do research work in the laboratories of Pennsylvania State College.

Chemical Foundation Sustained

Final decree was entered by Judge Robert Nevin in the suit of the Chemical Foundation vs. Ault and Wiborg, the Chemical Works, Inc., and Walter O. Woods, ex-treasurer of the United States. The decree follows the decision of the United Supreme Court in the case of the Foundation vs. duPont and the treasurer of the United States, involving the Foundation's right to royalties paid to the Alien Property Custodian for use of German formulas during the war. Judge Nevin found that the Foundation was entitled to recover from Ault and Wiborg from funds paid by it to the Alien Property Custodian in the Treasury, royalties totaling $1802, and to recover from the Chemical Works royalties totaling $668, the same to be paid from funds in the hands of the Federal Treasury.

—*Chemical Markets*

The recent inauguration of the Louis de Queiroz Laboratories at Piracıaba may be of interest to American manufacturers of laboratory chemicals. Designed closely along the lines of the Cornell University laboratories the new workshop embraces facilities for quantitative and qualitative analysis, for general organic and mineral chemistry, for advanced chemistry of soil and plants, and for general experimental work.

Cyril S. Kimball of Foster D. Snell, Inc., recently sailed for Havana on business. He is expected to return to New York before the middle of November.

John F. Ross has left the J. T. Baker Chemical Company to accept a position as research chemist with the Mallinckrodt Chemical Works, St. Louis, Missouri.

Governor Mills has appointed **Theodore Swann** a member of the Alabama Industrial Board for a period of twelve years.

W. D. Huntingdon, vice-president of the Davison Chemical Company, is on a trip through the South visiting the various plants of the company.

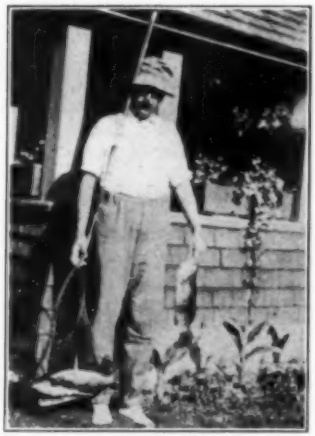
A Saskatchewan branch of the National Chemical Association of Canada has been formed to further the interests of chemistry. The officers of the new organization are: Dr. T. Thorvaldson and Dr. R. C. Larmour, honorary presidents; W. A. Sutherland, president; F. Rodman, vice-president, and A. Van Cleave, secretary-treasurer.

By unanimous vote of the Perkin Medal Committee, the Perkin Medal for

1932 has been awarded to **Charles F. Burgess** of the Burgess Laboratories, Madison, Wis., for his achievements in the field of electrochemistry. The medal will be presented to Dr. Burgess at a meeting in New York on January 8th.

Chemist and Fisherman

Whether great chemists put some particular lure on the bait, we don't know, but the evidence is piling up in this office that distinguished scientists can catch fish. Last month we resisted the



temptation to print a picture of Frank Tone's 32-pounder. This month we are showing Professor Marston T. Bogert of Columbia with some of the black bass he caught in Maine.

The CHEMIST'S laboratory boy says that with three lakes to pick from Dr. Bogert ought to be able to catch fish.

Frederick Taylor Gurney, has just returned on leave of absence from Teheran, Persia, to work toward his Ph.D. in chemistry at Chicago.

Joseph F. Padlon, F.A.I.C., is now connected with the law firm of C. P. Goepel, 165 Broadway, New York.

At a meeting of the North Jersey Section of The American Chemical Society on October 19th, **Lawrence V. Redman,** F.A.I.C., discussed the value of research in combatting the depression. In the course of his talk he touched upon the gold and silver standards, Sovietism, Gandhi, and capitalism.

About 150 people attended the meeting and the dance that followed.

Research Assured

Slash pine as a source of newsprint will be thoroughly investigated by the state of Georgia. The state legislature has just appropriated $20,000 a year for two years to maintain the experimental research plant offered by the Chemical Foundation. The $50,000 gift of the Foundation will be used for a building to be begun in the near future. Already found feasible in the laboratory, the commercial suitability of slash pine for newsprint will now be examined.

Harry J. Hosking has resigned his position in the research laboratory of the Roessler and Hasslacher Chemical Co. at Niagara Falls, N. Y. to take up similar work with Foster D. Snell, Inc., 130 Clinton St., Brooklyn, N. Y.

A recent announcement states that the German I. G. has secured a controlling interest in three important Roumanian firms, thus strengthening its hold on chemical trade in that country.

Simon Freed, after a year in Leiden on a Guggenheim fellowship, has joined the chemistry department of the University of Chicago.

Karl T. Steik has accepted an appointment as chief chemist and director of research with the National Oil Products Company of Harrison, N. J.

W. W. Hickman, professor of chemistry and dean of science at Assiut College in upper Egypt since 1909 is back in this country on sabbatical leave of absence. When Dr. Hickman went to Assiut College, the entire department of science was housed in one room. It now occupies twenty-three rooms. A new building of twelve additional rooms is being provided. There are 250 students in chemistry, 300 in biology, and 350 in physics. All of the subjects are being taught in two languages—Arabic and English. To meet the demand for Arabic textbooks Dr. Hickman developed both textbooks and laboratory manuals in that language.

Edward Gudeman, F.A.I.C., leaves December first for an extended trip to Mexico and the Southern and Western states to prepare a report on the economic chemical conditions in those sections for some prominent financial companies of Chicago. He expects to drive his car the whole distance of about 7000 miles.

Marshall Dill, San Francisco, announces the appointment of **L. Kraach** to take charge of the export and heavy chemicals department.

John A. Silver, of the F. J. Stokes Machine Company, has returned from a six weeks' business trip in Europe.

A Chemist at Home

Caltech's newly appointed professor of chemistry, Linus Carl Pauling, married Ava Helen Miller in 1923. They have two sons, Linus Carl, Jr., aged six years, and Peter Jeffress aged six months.

Professor Pauling this year is teaching graduate courses and supervising the research of about ten Ph.D. candidates. He believes that the next decade will see the rapid development of structural chemistry through the application of modern physical theories to chemical problems.

The Langmuir medalist's hobbies are traveling and trips into the Californian deserts. He is a D.U.

Professor Papish of Cornell announces the discovery of element number 87 in the mineral samarskite.

R. V. Townend, formerly with the Calco Chemical Company, has accepted a position with the Georgia Rosin Products Company.

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